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# Contractors and Engineers Monthly

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# WEAR?

*January 1, 1928*

<i>Part</i>	<i>No. Outstanding</i>	<i>Replaced 1927</i>
Center Drive Truck Shoe	36300	159
Center Drive Tread Pin	72600	704

*5 per 1000 and 11 per 1000 respectively*



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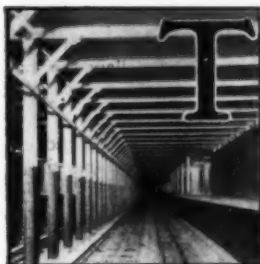
Volume XVI  
Number 3

# Contractors *and* Engineers Monthly

March,  
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## Buildings Collapse on Subway Work

*Two Laborers Killed When Rock Slide Occurs*

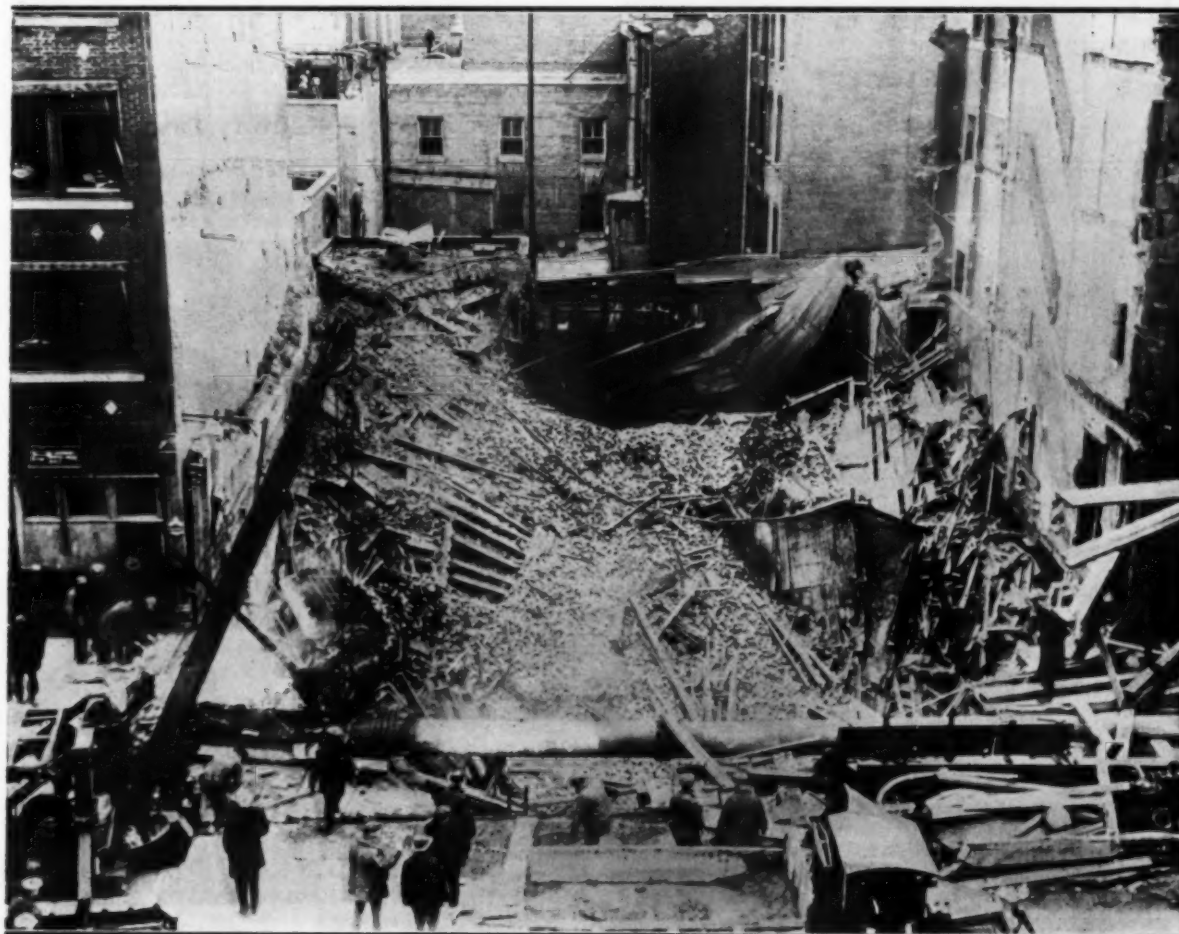


THE following report on the collapse of several brick buildings along the line of the new Eighth Avenue Subway in New York City, was prepared by Col. John R. Slattery, Deputy Chief Engineer, Board of Transportation of the City of New York, especially for publication in **CONTRACTORS AND ENGINEERS MONTHLY**.

Colonel Slattery's report is as follows:

"On February 16, 1928, at 1:45 P. M., three buildings, known as 874-876-878 Eighth Avenue, collapsed. These buildings were three of a group of several purchased by the Board of Transportation, in connection with the construction of the tracks which turn just north of 52nd Street from 8th Avenue into 53rd Street to provide for trains operating between Jamaica and downtown points via Eighth Avenue.

"One of the purposes in securing the property was to provide an area for the contractor's plant. The contractor removed all tenants from the buildings and utilized the buildings, which collapsed, and the buildings on each



*Scene Shortly after the Collapse of Buildings on Eighth Avenue Subway Construction, New York City*

side thereof for shops and offices. The contract provides for the wrecking of these buildings. Rather than wreck them at the beginning of the job, the contractor elected to utilize them for shop and office purposes, and he therefore underpinned the buildings and was constructing the subway beneath them at the time the collapse occurred. The collapse was due to a slide of rock on which two concrete piers had been constructed to support a system of steel beams spanning the cut and supporting the buildings. The rock slide removed the supports on one end of the beams and thus allowed the wall carried by those beams to fall. The wall was a party wall and as it fell, the floor beams pulled the other walls of the building into the cut.

"There was no indication of a rock slide at this point until within a few minutes before the accident occurred, when the general superintendent in going through the cut noticed that there had been a movement in the rock. He immediately gave the alarm. The men working in the cut, some five or six in number, all escaped. The general superintendent then ran to the buildings above and gave the alarm, and all but two of the men escaped. These two were caught by falling debris and were killed."

### 2-ton Dump Trucks Speed Up Road-graveling Work

WITH numerous Federal, State and County road-building projects in operation, the mileage of improved highways everywhere in this country is increasing by leaps and bounds. Of the 3,001,825 miles of road of all



*Weighing the Loads of Gravel on the Yellowstone Highway Job*

types in the United States, around 600,000 miles are now surfaced, and the expenditures for new highway construction and road maintenance total approximately a billion dollars a year.

Motor trucks are playing a big role in making this big road construction program possible and in speeding the work and holding down operating costs. To be popular in this kind of work, trucks must have speed, rugged construction, and short turning radius.

Ten International Harvester 2-ton Model-SD dump trucks were used by the Tyler & Baker Construction Co., of Cheyenne, Wyoming, last season, on the new Yellowstone Highway, about fifty miles north of Cheyenne. These trucks were used in surfacing the new road with gravel at a depth of 7 inches and width of 18 feet at the rate of 1,700 feet a day. The average haul from the pit was three miles, and each truck traveled on an average of about 140 miles a day.

### Heavy-Duty Equipment Used by the Boston Elevated Railway Co.



1. The Shovel Rigged for Electric Drive With Power Taken from the Trolley Wire. The End of the Boom is Protected from the Overhead Wire by Wood Sheathing. The Shovel is Mounted on Wheels for Use on Street Railway Tracks and on Crawlers for Street work. 2. A Walter Snow Fighter is Used to Haul Away the Broken Pavement During a Repair Job in Park Square, Boston. 3. A Buffalo-Springfield Tandem Roller, Rebuilt in the Company's Shops for Gasoline Operation With a Wisconsin Gas Motor.



# Moving a 3200-Ton Bridge 12 Miles

By M. W. von Bernewitz



**I**N THIS magazine for April, 1927, the writer gave a short account of bridge construction at Pittsburgh, Pa. It was mentioned that the Sixth Street bridge across the Allegheny River was to be lowered on to barges and floated down the Ohio River to a new position. The cover of that issue showed an air view of this bridge, and this is reproduced here on a smaller scale.

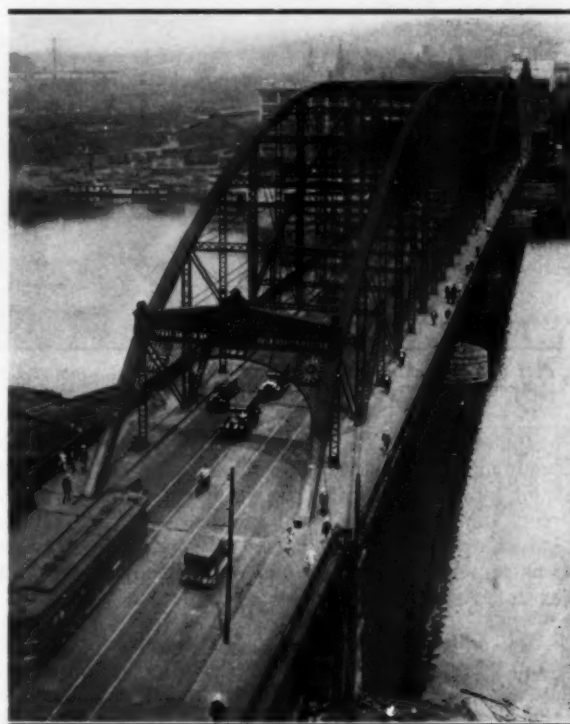
## DISMANTLING OR REMOVING BRIDGES

All of the other bridges across the Allegheny and Monongahela rivers that have been or are being replaced were or will be dismantled, but the Engineers of Allegheny County found that the Sixth Street bridge would be suitable for a proposed crossing at Coraopolis, across the back channel of the Ohio river between the south bank and Neville Island. The accompanying map shows where the Sixth Street bridge was and where it has been re-erected. It had to pass under two bridges 72 feet above pool level and through one lock. The County Engineers estimated that the removal of the bridge would save \$450,000 over what it would cost to build a new one at Coraopolis. The old bridge at Pittsburgh is being replaced by a self-anchored eye-bar suspension bridge almost similar in every respect to the graceful Ninth and Seventh Street bridges built by The Foundation Co. and the American Bridge Co. in 1925 and 1926, respectively, and which will build the new one at Sixth Street. The Foundation Co. also had the contract for removal of the bridge and its re-erection at a cost of \$316,000.

## PREPARATION OF BRIDGE FOR REMOVAL

The Sixth Street bridge was closed to street car and vehicular traffic on January 1, 1927. The contractor then began to prepare it for removal—cutting off the

two sidewalks which would not be needed in its new position, stripping off the concrete pavement from the roadway, cutting off shore connections, cutting down the two old piers to admit of placement of the hydraulic jacks for lowering, and other essential jobs.



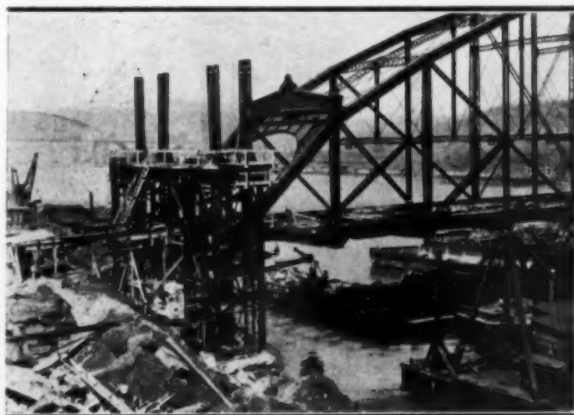
*The Sixth Street Bridge as it Appeared Before Moving. Note the New Piers for the New Bridge under the Center of Each Span.*

The Sixth Street bridge was erected in 1892 and has therefore served considerable and growing traffic for 35 years. It is of the through-truss type, pin-connected, one end on rollers for expansion. The two trusses are each 440 feet long, 44 feet wide, 80 feet high and weigh, as prepared for removal, 1600 tons each.

## METHOD OF LOWERING TO BARGES

Briefly, the method of lowering the two sections each on to four standard 1000-ton capacity steel coal barges, of American Bridge Co. make, was as follows:

The south span was moved first, and the operation serves for the north span. Steel towers were erected on the shore and center piers to take the load of the span. As soon as the load was on the towers the masonry piers were removed to river level. In each tower, each of the four shoes of the span was supported on tension plates or steel straps, 1 inch by 18 inches and 47 feet long, punched with 26 7-inch holes at 15-inch centers to take the weight of the span, on pins slipped in these 7-inch holes, when the four 500-ton hydraulic jacks had run out. One end of the span was lowered at one time a distance of 15 inches. Then the crew went to the jacks



*The Jacking Platform on the Pittsburgh Shore. The Old Pier Has Been Cut Almost to Water Level to Make Space for the Towers.*



*Part of the Jacking Platform Showing the Pins Shimmed Up.  
The Jack is Below the Shims*

at the other end. The total actual lowering time was 14 hours and the distance 18 feet. As a new pier had been built for the new bridge, between the shore and center pier, this made it difficult to maneuver the loaded barges out of line and down the river. The clearance was a matter of inches only, but the maneuver was executed successfully.

#### PREPARATION AND BEHAVIOR OF BARGES

As will be seen from the pictures of the span afloat, the barges were prepared by having steel girders laid across, and on top of these were forty-two blocks or pyramids of blocks on which the span rested when lowered from the piers. The barges as prepared drew 2 feet of water and 5 feet when loaded with a span. When the span had been loaded on to the barges, it was well braced from the bottom of the barges by means of 12 x 12-inch timbers.

#### DISMANTLING AND RE-BUILDING THE SPAN

As the top of the span was 27 feet too high to pass under the Manchester bridge, the top chord was dismantled, as shown. This was replaced when the barges had been tied up at the lower end of Neville Island in the Ohio River. Then the first span was lifted 34 feet by the same towers and hydraulic jacks as were used to lower it at Pittsburgh on to the new foundations near Coraopolis. These towers and jacks were again used to lower the north span at Pittsburgh and raise it at Coraopolis.



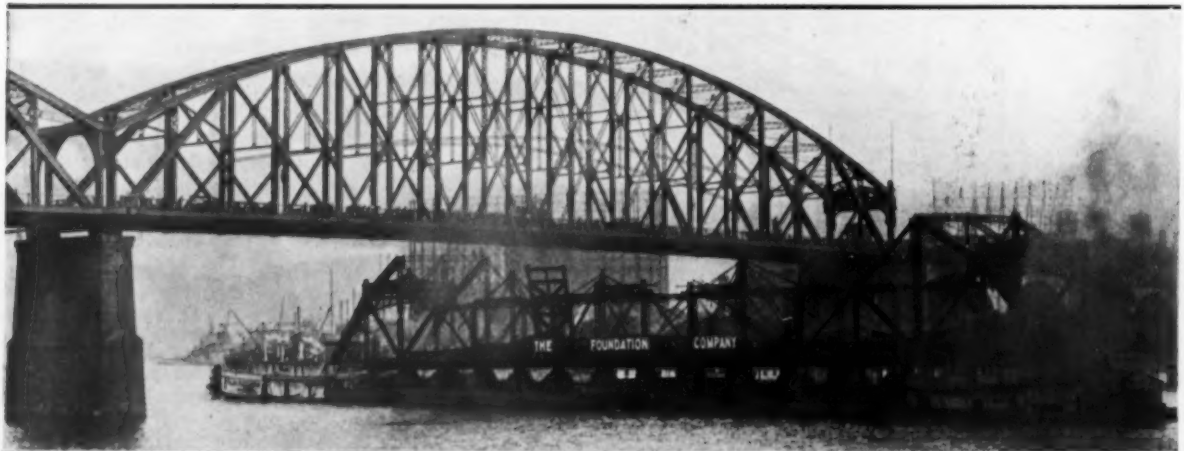
*One of the Four Shoes of the South Span Shown Free. The Span Is Resting on the Barges. Note How the Old Pier Was Cut Away to Make Space for the Jacking Towers*

The re-built bridge appears as shown, but it is not at its full height and will not be ready for traffic for some time.

#### PERFORMANCE DATA

George R. Johnson, Vice-president, The Foundation Co. at Pittsburgh, through D. T. Jerman, District Engineer, has supplied the following performance data:

Work started dismantling bridge .....	January 1, 1927
South span:	
Lowered on to barges .....	May 4

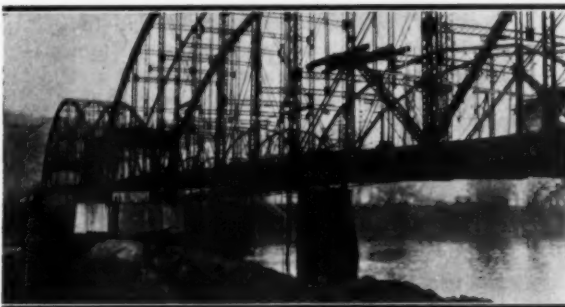


*View of One Span Being Towed Under the Manchester Bridge Showing the Top Cord of the Span Dismantled*



*The Span in No. 1 Lock of the Ohio River*

Dismantled to go under bridge .....	June 22
Moved down Ohio River .....	June 22
Re-built .....	July 26
Re-erected at Coraopolis .....	September 3
North span:	
Lowered on to barges .....	July 29
Dismantled to go under bridge .....	August 22
Moved down Ohio River .....	August 22
Re-built .....	September 14
Re-erected at Coraopolis (first lift) .....	September 21
Total period of dismantling, removal, and re-erection, days .....	140



*The Re-erected Bridge at Coraopolis*

## The Mechanics Lien Law

**C**AUTION in extending credit, equal priority and amendments to the present statute are the means recommended by Richard Gordon Babbage, President of the United States Realty & Improvement Co., and general counsel for the George A. Fuller Co., New York, for remedying the present credit system as it affects contractors and builders. Mr. Babbage cautions contractors and material men to be more careful in their methods of doing business with owners, and advocates amendments to the present mechanics lien law so that all liens would have equal priority as far as practical, would date back to the making of the contract and would permit contractors and subcontractors to file waivers or partial waivers of lien. Since Mr. Babbage has, for many years, represented corporations lending money on real estate, persons owning real estate and persons contracting for and agreeing to erect buildings, the suggestions he offers are practical. In the discussion Mr. Babbage said:

"We all recognize that any lien law must protect an owner so that he will have to pay only once for his building and will be able to obtain money on mortgage for the purpose of meeting his obligations in relation to the building enterprise, it must protect the contractor so that he will be assured of pay for the labor and materials, which he supplies, and also the honest mortgage lender so that he will be protected in making advances to the owner.

"In this country, there has lately been a tendency improperly to invoke legislative aid to protect people against their own failure to exercise proper caution and control in the conduct of personal and business affairs. But no lien law can be drawn

so as to render it unnecessary for a contractor to investigate and to have some knowledge about the persons to whom he is to supply labor and material, and what means they have to meet the credit which he is extending them. In whatever plan which may be adopted, the contractor must pass on the subject of credit, just as does any other business man in his particular line of business.

"In New York State, which has a very practical law, as soon as a contract is signed, the contractor has the right to file his notice of lien and his lien then immediately becomes effective. But he seldom does this. In some states, the contractor has a lien from the mere fact of supplying labor and material to the building, and does not have to file a lien until a certain period has elapsed after the completion of the work. In some of the Provinces of Canada, the laws provide that every one who supplies labor or material is entitled to a first lien for the value which his labor and materials have added to the property, but his lien, of course, is of equal priority with other first liens of persons similarly situated.

"Under the New York law, the owner is justified in paying the contractor if no liens have been filed, and the lender of the money may make advances to the owner if no liens have been filed. The building loan lender has to follow the provisions of the building loan and the contract, which are filed, but these provisions are commonly made so broad that the lender can advance any reasonable amount of money to the owner without departing from the terms of the contract.

"The proposed provision that a law should be passed making the owner civilly and criminally liable, would be little protection. The requirement that all building contracts shall be filed and recorded would be a very onerous one. Our present law gives the contractor the opportunity of deciding at the time he starts the enterprise whether to rely upon the credit of the owner or file a lien upon the land. One fault, however, exists in the present New York law, and that is that the priority of a lien can be filed. Some method should be devised, by which all liens should have equal priority.

"The following suggestions would do much to alleviate the present practices: 1. to do something which will cause contractors and material men to be more careful in extending credit; 2. to amend the law so that all mechanics liens have an equal priority so far as practical; 3. to amend the law so that the lien shall date back to the making of the contract, but not be more than a certain number of days before the commencement of the work under it, the notice to be filed within a certain period after the completion of the work; 4. to insert appropriate provisions permitting contractors and subcontractors to file waivers or partial waivers of lien, which will preclude them and those claiming under them from claiming a lien.

"The suggestion in relation to having the lien exist independent of a notice of lien having been filed will, of course, be opposed by the title companies and the mortgage lenders because it will throw upon them the burden of ascertaining who are working upon the job and of seeing that proper waivers are filed. It will, however, force the contractor to do some affirmative act in order to cancel his lien instead of merely omitting to file his notice. It will protect him against subsequent mortgages and sales of property without proper provision having been made for the payment of his claims.

"Where the general contractor and the owner are of undoubted credit, they will be able to obtain these waivers and satisfy the title companies and the lenders that there is no reasonable fear of any liens existing. This change is burdensome and is only rendered advisable by the failure of the contractor and the subcontractors to file liens under the present law when they get their contracts. The contractor must guard himself against any inflated mortgage at the time he makes his contract by ascertaining what the mortgages are upon the property and passing upon the amount of them himself."

ACKNOWLEDGMENT.—From an address recently delivered at a meeting of the Credit Assn. of the Building Trades of New York.



# Welding—Methods and Uses—I

*Structural Pipe and Industrial Welding  
Discussed by Manufacturers and  
Users at Boston Meeting*



At a recent meeting held under the auspices of the Affiliated Technical Societies of Boston, in Boston, Mass., a most interesting and instructive program was presented on structural and industrial welding. The meeting involved morning, afternoon and evening sessions with luncheon and dinner. Because of the rapid strides made by welding in the construction field and the fact that all contractors are striving to learn more about the methods and strength of welding, we are presenting herewith abstracts of the papers presented.

## General Principles of Various Welding Processes

By F. M. Farmer

*President, American Welding Society, New York*

**Definition of a weld**—"A solid union of metallic parts formed by either heating to a plastic or fluid state the surface of the parts to be joined and allowing the metals to flow together with or without additional molten metal and without any pressure being supplied; or by uniting or consolidating by hammering or compressing with or without previous softening by heat."—Adopted by the American Institute of Electrical Engineers and the American Welding Society.

### FUSION WELDING

**Fusion welding** includes those types where the weld is effected by fusing together the ends of the pieces to be joined by the application of heat and with or without the addition of extra metal, but without the application of pressure.

In **gas welding**, heat is applied to the two surfaces to be joined by means of a flame resulting from the burning of a mixture of acetylene and oxygen which furnishes one of the hottest flames known. The edges of the pieces to be joined after previous preparation

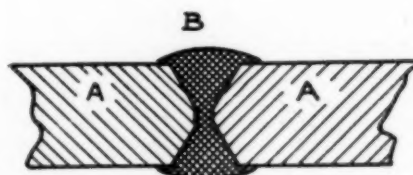
are held in position with the proper small clearance between them, heated to the fusion point by the application of the flame and then metal is added by means of a welding wire much in the same general fashion as solder in an ordinary soldering operation. The important features of a gas welding operation are the proper mixture of the two gases so as to obtain complete combustion but without an excess of oxygen, the right flame for the size of work, the proper kind and size of welding wire and, as in all welding operations, the proper technique on the part of the welding operator. This process is particularly applicable to the welding of thin material because of the ready control of the intensity of the flame.

**Electric arc welding** involves the use of the electric arc, the hottest source of heat known. The arc is established between the edges of the pieces to be joined which serve as one electrode and a suitable rod which forms the other electrode. Two general subdivisions of this class of welding are indicated by the type of electrode, the carbon or graphite electrode or the metal electrode. In carbon arc welding direct current is usually employed with the work as the positive side of the circuit because the positive crater of an arc is hotter than the negative crater. With the edges of the pieces to be joined heated to the fusion temperature by drawing an arc between them, and a carbon or graphite rod, the necessary additional metal is applied to the fused mass from a wire as in gas welding. In metal arc welding, the welding wire itself is used as the electrode. Metal arc welding may be done with either direct or alternating current, although direct current is the more generally used with currents ranging from 75 to 250 or 300 amperes at 15 to 25 or 30 volts, depending upon the size of the work, the size of the electrode, quality desired, etc.

A most important feature of the arc welding process is a short arc. Oxygen and nitrogen are very readily absorbed from the air by the extremely hot metal, thus forming oxides and nitrides which are extremely objectionable in the weld. The shorter the arc the less opportunity for oxygen absorption. A steady arc of



Single V Joint



Double V Joint

*Two Types of Electrically Welded Joints in 1/2-inch Steel Plates*



constant length is essential, hence automatic control of the voltage or current or both is provided in the special generators used in this work. One scheme developed to inhibit the absorption of oxygen and nitrogen is to supply a protecting gas around the arc or a protecting slag on the molten metal by means of the addition to the welding wire of a suitable material as a core or as a coating on the outside. A more recent development is the scheme in which the arc in the regular metal arc process is surrounded by a reducing gas, such as hydrogen, supplied through a concentric tube surrounding the electrodes. Another recent development to overcome oxidation is the atomic hydrogen welding process.

In arc welding, the surfaces to be joined must be thoroughly fused all over before they can be fused together. This requires a space between the edges so that the arc or gas flame will have access to the entire surface of the edges. Furthermore, when the edges are over one-quarter inch thick, it is necessary to bevel the edges so that the bottom parts of the surfaces will be accessible to the heat. This space is then all refilled with the molten metal supplied from the welding wire. The illustration shows two types of joints in  $\frac{1}{2}$ -inch steel plate, known as single V and double V, respectively. Proper penetration means complete fusion over the entire surface between the parent or base metal, A, and the added or weld metal, B.

**Thermit welding** involves the formation of a casting between the surfaces to be joined, the metal being poured in place with sufficient super-heat to fuse the adjacent metal with it. Finely divided aluminum, which burns very rapidly with the production of a high temperature, is mixed with finely divided iron oxide in a suitable crucible. The mixture is ignited and upon the completion of the reaction, the molten metal at a very high temperature is poured into a suitable mold surrounding the joint to be made. The process is in extensive use, particularly for large work, not only for joints between large pieces, but in effecting repairs on large parts.

#### PRESSURE WELDING

Pressure welding involves the use of both heat and pressure as distinguished from fusion welding where no pressure is employed.

**Thermit pipe welding** involves the use of the thermit process described above, the parts to be joined being forced together under pressure at the proper stage in the process. No metal is added to the weld, the super-heated metal being simply poured over the joint, which is surrounded by a suitable mold. This heats the abutting ends of the pipe to the fusion point and then they are pressed together.

**Resistance welding** is a very old electric welding process invented over 40 years ago by Professor Thompson and is now very extensively used in industry. It makes use of the principle that at a spot of relatively high resistance in an electric circuit heat is developed. If two metal rods are butted together, end to end, the resistance across the joint is much higher than in an equal length of any part of the rod. With sufficient current fusion of the end surfaces takes place. Then, if the current is interrupted and the rods pushed to-

gether, a weld will be made. Resistance welding is subdivided into butt welding, which is the process described above and is applied to extremely large work, as high as 35 to 40 square inches of abutting surfaces, employing currents over 100,000 amperes with a transformer capacity of the order of 1000 kilovolt amperes and utilizing pressures up to 100 tons.

**Spot welding** is an application of the butt welding idea to "spots" between flat pieces. The current is restricted to a spot by copper studs or electrodes to which pressure is applied when the fusion point is reached.

**Seam or line welding** is also an application of the butt welding idea wherein what is in effect a continuous series of spot welds is made, forming a continuous

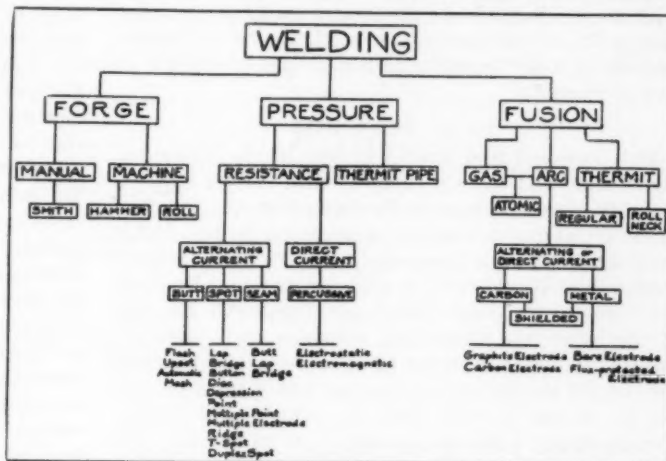


Chart Showing the Relationship of Various Kinds and Types of Welding

joint along a line between two flat pieces. The studs are replaced by copper roller electrodes between which the work is moved.

**Percussive welding** is a form of resistance welding wherein the electrostatic energy in a charged electrical condenser or the electromagnetic energy in a magnetized magnetic circuit is suddenly discharged across the joint to be welded. The surfaces are instantly heated to the fusion point and then the application of pressure completes the weld. This method is particularly suitable for small work.

A diagram is shown summarizing the relations between the various processes.

#### Examples of Arc Welded Steel Construction

By Gilbert D. Fish

Consulting Engineer, Westinghouse Electric & Manufacturing Co., New York

Tests prove that arc welded joints can be made stronger in every way than the members joined and that arc welded girders can be made to resist greater stress than riveted girders of the same dimensions and weight. Confirmation of these tests has been secured in practice. A number of arc welded buildings have been erected and tests made on the completed structures have shown that the strength of the joints conforms quite accurately to calculations.

### LESS STEEL NEEDED

Two classes of cost saving are secured in welded construction. There is a reduction in the tonnage of steel required and there is a saving per ton in the cost of steel handled. Tonnage is saved by the use of lighter members through the elimination of much connecting material. For example, a five-story arc welded building at Sharon, Pa., contains 12 per cent less steel than would a similar riveted building. In a welded railroad bridge constructed at Chicopee Falls, Mass., the amount of steel used was 33 per cent less than that needed for riveted construction.

Savings in the cost of handling are due to the fact that a very large proportion of the punching, fabrication and detailing essential for riveting is not needed with arc welding. In an arc welded building erected at Derry, Pa., 60 per cent of the steel was not fabricated and the cost of the structure was 13 per cent below its cost if riveted.

### STRONG STRUCTURES

It is expected that welded bridges of the future will prove somewhat more permanent than riveted ones because the immovability of the joints removes the chief cause of fatigue. Although weld metal is less ductile than rivet steel, a properly designed and executed welded joint should have greater endurance under stress reversals than a good riveted one, because in the case of the latter, the connection members and rivets are subject to slight motions back and forth frequently beyond the elastic limits. Another factor favoring long life for welded joints is their smoothness and absence of rivet heads, with corresponding ease of painting and lessened tendency to corrode.

### GOOD WORK ESSENTIAL

Now that arc welding is widely regarded as a coming method which may presently cause extensive changes in structural practice, it is time to sound a warning against its hasty or ill-considered adoption by those to whom it looks too easy. The opposition that has been faced has forced careful consideration of every step and has called for proof of the safety of every detail and has brought about inspection of more than ordinary thoroughness. With the recent noticeable relaxation of opposition to welded construction, with the rapid awakening of interest among steel fabricators, engineers and architects and with the rising demand by the public that the clamor of pneumatic riveters be stopped, there approaches a day when bad engineering or bad welding may cause something to give way.

There is nothing dangerous about welding if proper control is exercised. The only danger is that which is inherent in any new method—lack of experience on the part of those using it. The steps necessary to insure control are correct engineering, schooling of welding operators and inspection by men trained in that work.

### FURTHER ECONOMIES

The success already obtained by arc welded construction in cost competition with older methods is a sure indication of inherent economy. As design economy becomes better understood, as shop arrangements and equipment become adapted to welded fabrication, as labor becomes more efficient in handling the

methods and as high speed automatic welding reduces welding costs, the relation of costs between welded structures and riveted ones will vary in favor of welding.

## Welding Trusses for Industrial Buildings

By Andrew Vogel

*General Electric Co., Schenectady, N. Y.*

The reduction in the amount of steel required for trusses that are arc welded in comparison with trusses that are riveted, is only a problem in mathematics. A riveted Warren truss of 58-foot span and a welded design of the same truss were prepared for comparison. Also, a riveted Pratt truss of 80-foot span and a welded truss were designed for comparison. Calculations of the weight of these trusses indicated a saving in weight of between 12 and 15 per cent in favor of the welded trusses. It has been definitely shown that the cost of welding trusses is no more than the cost of riveting trusses; and if such continues to be the case, the overall cost of welded trusses will continue to be less than the overall cost of the riveted trusses. Trusses are fabricated in the shop where actual and definite costs can be more readily established than in the field and the work can be under closer observation, but there has been insufficient experience to date to determine the actual cost of field work with respect to riveting versus welding.

In order to obtain data on unit stresses for welding it was found on search that many tests had been made to determine the actual unit stresses to be used for the various types of welds. It was found, however, that invariably the specimen itself either distorted badly or broke before the welded joint had reached its maximum capacity. Obviously, that type of test specimen was wrong. It then became necessary to design a test specimen that would fully develop the welded joint to its ultimate capacity without the specimen itself being stressed beyond its elastic limit; in other words, the welded joint must be broken before the specimen became distorted. A group of 24 specimens were so designed for welds of 3, 4, 5 and 6-inch lengths. These specimens were in groups of three, each group designed for testing in tension and compression. In all cases, however, the welds were designed to fail in shear on a plane perpendicular to the long side of the triangular cross section of the fillet weld. This section of the weld, being its weakest plane, is in pure shear if no secondary stresses occur at the joints due to deflection or distortion of the specimens. Of the 96 welds in this series of tests, 93 broke along the shear plane and 3 broke along the contact plane, the shear plane being defined as the plane across the triangular cross section of the weld and the contact plane being defined as the plane where the welding material is in contact with either member to be joined together. In each of the three cases where the specimen failed at the contact plane, bits of the parent metal were torn out, showing that thorough fusion had taken place.

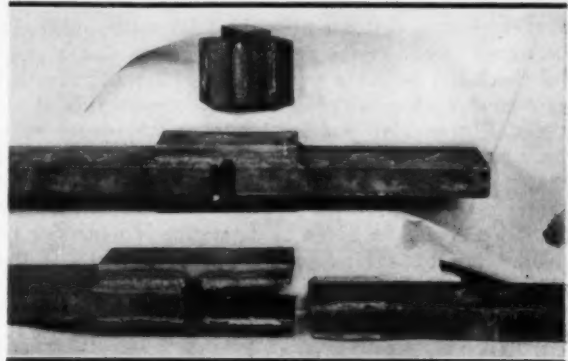
In order to indicate the uniformity of these tests, they were divided into two parts, the compression group and the tension group. The compression group gave higher values than the tension group. This has been explained by the fact that the compression group were short, chunky specimens in which bending could

not occur due to the stresses in the specimen, while the tension group were, of necessity, long specimens in which bending would occur even though the stresses were within the elastic limit.

From the tests so made, it was determined that welding with a minimum contact distance of 5/16-inch and a maximum contact distance of 3/8-inch, the variation being specified to allow for inaccuracies of workmanship, permitted a unit stress of 3000 pounds per lineal inch. The tests indicated a range of 11,570 pounds to 14,040 pounds per lineal inch with an average of 13,055 pounds per lineal inch for welding of 5/16-inch contact distance with 10 of the 12 specimens having a value of 12,300 pounds or more per lineal inch and the other two 11,570 pounds and 11,930 pounds per lineal inch. Basing the unit stresses on the values obtained from tension specimens alone, a factor of safety of 4 or better is obtained in practically all cases. If the compression specimens are considered, a factor of safety of 5 or better is apparent in all cases. In order to be conservative, the value of 3000 pounds per lineal inch of weld was adopted as a standard for this discussion.

It was necessary to make various truss designs and compare them with riveted trusses in order to see what results would be obtained. In comparing a riveted Warren-type truss used in a General Electric building and a welded truss for the same purpose, it was found in the welded truss that the gusset plates could be entirely eliminated. On the riveted truss the stresses in the members are cared for at the joints by riveting through gusset plates. In other words, the members are not directly connected together but are connected to another element, the gusset plate, which means that the connections are made more than once for each joint in nearly all trusses. The design of the welded truss, however, connects the members directly to each other, so that one unit of connecting material in the welded design is performing one unit of work while more than one unit of connecting material is required in the riveted design in order to perform one unit of work. It was also found that simpler members can be used, in welded trusses, resulting in a saving of rolling cost, handling cost, paint and inspection, all of which are important items.

For the present, it is desirable that welded connections should be designed as simply as possible, that the areas of welding should be concentric with the center of gravity of the members and that all welds should be designed as shear welds. At the present time tests are being developed for other forms of welded connections but until these tests are repeated enough times to determine definitely the unit values of such connections it has been decided that it is desirable to continue the simple connections now being used. Riveting and welding should be compared with respect to their relative economy in each particular work and which ever proves the more economical should be used. There is no conflict of merit between the two methods, simply the age old conflict of economy and which ever proves to be the more economical will survive in its proper sphere. But certainly, our experience with welded rapidly proving its utility and will be used more as it is appreciated.



*Tests on Welded Structural Steel Showing Compression and Tension Specimens After Failure*

## Pipe Line Welding from the Oxy-Acetylene Viewpoint

By Leroy Edwards

*Research Engineering Department, Air Reduction Sales Co.,*

Among the advantages resulting from oxy-acetylene welding of sections of pipe, is permanence of joints. A welded joint is of the same metal as the pipe and will last as long as the pipe itself without additional maintenance. The strength of the welded joint closely approximates the strength of the material in the pipe and the strength when properly made is much greater than that of screw fittings and some other types of construction.

Welded lines facilitate the transfer of liquids and gases because of the higher pressure which can be safely carried with less friction losses than screw and bell and spigot joints. The portability of equipment is greatly in its favor as lines can be constructed in any kind of country through which the material can be transported. This process also has the advantage due to less weight of material used in its construction than in cast iron pipe lines and, because of its great tensile strength, it is largely able to resist the expansion and contraction stresses due to changes in temperature.

The oxy-acetylene welded joint with completed penetration and with a suitable reinforcement will have strength equal to that of the parent metal in the pipe. The line is sufficiently flexible to follow the contour of the surface of the ground and bends readily to a long radius without being obliged to make any special provision.

In lines joined by screw joints only one section is joined at a time while in the welded line as many lengths can be joined as there are welders available, which may mean several hundred feet of pipe. An instance of this is a case where 50 miles of 10-inch pipe line were welded and laid through a series of towns in 45 days. In this case the pipe was welded faster than three trenching machines were able to dig, the machines working 24 hours per day. Records like this require a trained organization and competent welders interested in producing the largest number of welds per day.

### PREPARATION FOR PIPE WELDING

In considering the installation of a pipe line, it is



very necessary that attention be paid to organizing a personnel to handle the field operations so that a careful check can be made as work progresses and thus insure good workmanship and speedy construction at all times. In making welded joints certain dependence must be placed on each individual welder and for this reason the welder should be carefully trained and made thoroughly familiar with pipe line welding. Particular attention should be given to determine if underside or overhead welds are as good as those on top. If the work of the welder is satisfactory on one or more tests of this kind, it can be considered safe to allow him to weld on the pipe line. If his work is not but shows promise or ability, he should be put through a course of training until he is able to make satisfactory welds. If this procedure is followed the men will understand that perfect work is expected of them and will continually strive to maintain quality.

A standardization of all torches, regulators and equipment used on the line is very desirable, because it facilitates maintenance, insures uniformity of procedure and enables all welders to operate under exactly the same conditions. In other words, by standardization of equipment, tip sizes, pressures, speed of operation, and methods of welding, the kind of joint produced can be absolutely controlled and the result is evidenced in more economical and more satisfactory welding.

#### ALIGNING A PIPE

Next in importance to the welding operation is the care and attention required in the aligning of the joints in order that perfect welds can be produced economically. There are various methods of aligning pipe and the methods selected depend on the conditions where the pipe is to be welded and laid. Many concerns favor supporting pipe on timbers, blocking up so that the edges are in proper position and so that it can be rolled while making the weld. This method is very satisfactory. Others prefer cutting a V in blocks so that the pipe can be revolved without being thrown out of line. In other cases a pedestal block with two rollers is used. This, of course, reduces the friction in the turning of the pipe. All of the above methods are found to be very satisfactory and are commonly used on piping 10 inches and smaller.

There are devices which have been developed which are of considerable assistance in holding the pipe in line during the tacking operation. One device consists of a lower member cut from steel plate and bent to the radius of the pipe, which extends beyond the end of the pipe to which it is attached. This extension forms a support for the adjacent pipe while the exposed portions of the joint are welded. This bottom member is quickly adjusted to the pipe by a series of links to which it is attached on one end, with a cam on the other end which engages with a curved lip on the bottom member, forming a linking which provides rapid adjustment.

The handle attached to the cam affords sufficient leverage to draw the links firmly together and raise a heavy pipe into proper alignment.

#### METHODS OF LAYING PIPE

Where it is possible to have fairly straight runs, it

is advisable to make all possible welds on the surface, either alongside the trench or over the trench with the pipe supported on timbers. The pipe can then be lowered into the ditch where it can be tied to the main line by excavating bell holes and making a tie-in weld.

There are several methods used in lowering pipe into the trench. One that has proved quite satisfactory in the case of heavy lines is as follows: portable steel horses to which are suspended chain blocks and slings are placed in position after the completed section of welded pipe has been placed over the trench supported on timbers and made ready for lowering. The slings are then attached to the pipe line and the chain blocks are used to lower it into the trench.

Another method is by the use of a lever with a rope sling. The operation is performed by having a supporting horse used as a fulcrum, and a lever to which a rope is attached to the short end. This rope is led around the pipe, and one or two turns taken around the end of the lever to be used as a snubber. The lever is then used to raise the pipe off the supporting timbers and as the rope is released the pipe is lowered into the ditch.

#### TESTING THE LINE

Various methods are used to enclose the ends of completed sections of pipe lines preparatory to applying the required pressure tests. One method commonly used where the test pressure is high is to make a torpedo-shaped head which is welded to the end of the pipe line and after a satisfactory test has been made is then cut off and used again for the next test. Another method is to weld a disc onto the end of a short piece of pipe the same diameter as the pipe line to be tested and this section is welded into the pipe line as was done with the torpedo type of head.

There are several methods in use for testing. The hydrostatic method with the hammer test is probably the most severe. This is made by pumping water into the line to the specified pressure, being sure to displace all air and hammering the pipe adjacent to the welds. The impact of the hammer blows causes the vibration to travel through the pipe and any weak joints will generally show up under this treatment. Because of the inability to get a sufficient water supply and also because of the difficulty of drainage, this method is seldom used. In the case of high pressure lines this test is very desirable before the lines are turned over to actual practice.

The method commonly employed in testing at ordinary pressures is by the use of air pressure and the application of soap and water solution which is painted over the joints. In case of a leak it will indicate itself by the air bubbles which form on the outside of the joint. This test is extensively used and has been found to be quite satisfactory.

#### Thermit Pipe Welding

By Robert L. Browne

*New York and New England District Sales Manager,  
Metal and Thermit Corporation, Boston, Mass.*

Thermit is a mixture of finely divided aluminum and iron oxide. The fundamental principle of the thermit process is the high chemical affinity of aluminum for oxygen. It is really aluminum burning with the oxygen



of iron oxide sustaining combustion. It is more difficult to start aluminum burning than it is to start wood or paper, as it requires a temperature of 2800 degrees Fahrenheit. Once started, however, it continues to burn without further external application of heat. The initial temperature is obtained by means of a small quantity of an ignition powder placed in one spot anywhere on top of the thermit in the crucible, which is in turn ignited with a match.

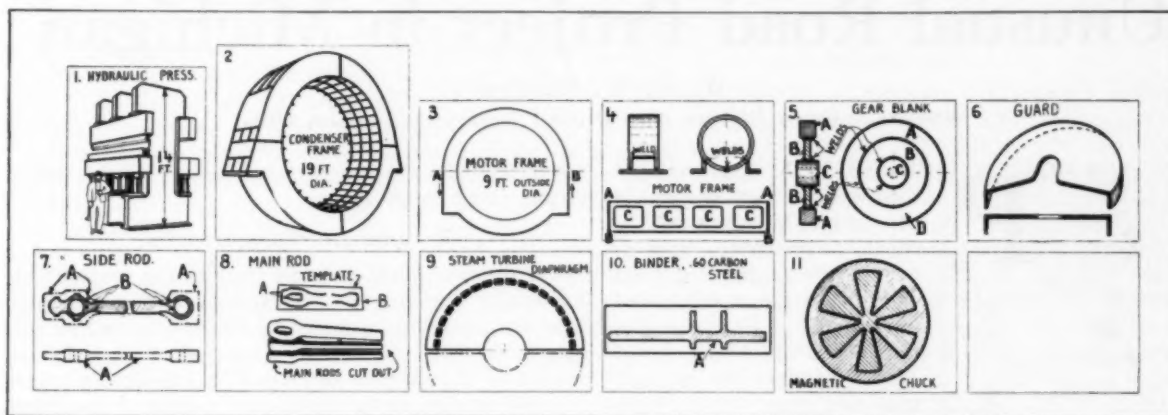
The aluminum in burning combines with the oxygen in the iron oxide and forms aluminum oxide or slag, setting the iron free. The slag being lighter than the iron floats on top. The temperature of this reaction

## Replacing Castings by Steel Elements Cut to Shape by Automatic Shape-Cutting Machines

By Dr. A. Krebs

Treasurer, General Welding and Equipment Co.,  
Boston, Mass.

Cast iron shapes cost about 7 to 9 cents a pound; cast steel, still more, whereas rolled steel of materially higher strength and ductility, costs only 2 to 4 cents a pound. By basing construction on rolled steel instead of cast iron castings, we therefore pay only about one-third per weight and need only one-half the weight to



### STEEL ELEMENTS CUT BY AUTOMATIC SHAPE CUTTING MACHINES

1. Hydraulic press costing one-third that of conventional cast construction. 2. Large condenser frame, the steel elements of which were cut and then welded. 3. Motor frame, part A-B cut by automatic shape cutting machine, rest cut by automatic circular cutting machine. 4. Motor frames flat plate rolled and welded and legs cut to shape and welded on. The openings C were cut in flat plates before rolling. 5. Steel gear blanks. Rim, web and hub cut by machine and welded. 6. Guards for grinding wheels. Steel plate cut to form a cover and then shaped by automatic cutting machine. 7. Locomotive side rod cut out of preforged billet. 8. Locomotive main rod cut out of preforged billet. 9. Steam turbine diagram, two halves cut out of about 2-inch plates with openings cut in by shape cutting machine. 10. High carbon steel binder for textile machine cut out without further finishing. 11. Magnetic chuck cut out of soft steel plate.

is approximately 5000 degrees Fahrenheit, a temperature which, properly controlled, can be utilized to advantage in many ways for welding different shapes and forms.

In joining pipe end to end by the thermit process of welding, thermit is used only as a heating agent to bring the pipe ends which have been previously faced and brought together up to a welding temperature, when they are then forced together by means of a special hand operated clamping device of simple design, thus making a forged weld.

The thermit steel and slag which are controlled by means of a special two part case with mold enclosing the joint are discarded after the weld is completed, thus leaving no foreign material which might be of a more or less porous nature as an integral part of the joint structure.

The thermit process is most commonly used in connection with extra heavy weight pipe up to and including 6 inches and double extra heavy pipe up to and including 4 inches.

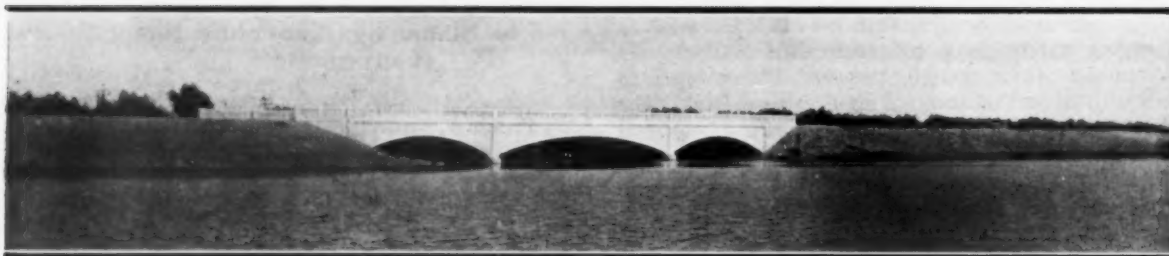
The rate of production varies from 20 to 50 joints a day, two men working, depending upon the size and weight of the pipe and the proper facilities for executing the work.

get the same strength and a higher ductility. By cutting various shapes from rolled steel and then welding these together it is possible to form a large variety of machine parts and bases economically. A number of examples are shown and are reproduced herewith.

The replacing of castings is not the only field for machine cutting. There is at least just as great a field in eliminating costly dies where forgings or excessively costly machinings are involved. In these cases, pieces are either cut completely out of flat stock or billets are roughly forged to shape and the intricate shapes are produced by machine cutting, as shown in Figures 7 and 8 of the illustrations.

Cost data shows that cutting a plate a thickness of  $\frac{1}{2}$ -inch costs about 95 cents per hour for gas and about 75 lineal feet can be cut in that time. Two-inch material requires \$2 worth of gas per hour and about 50 feet can be cut in that time. In 6-inch material, gas costs \$4.80 per hour and 24 feet can be cut per hour. The cutting line can safely be set to within  $\frac{1}{32}$ -inch of the ultimate shape with material up to 1-inch thick and for heavier thicknesses  $\frac{1}{16}$  to  $\frac{3}{16}$  inches allowance is preferable, so as to leave some finishing face where another part may have to be fitted on.

(Continued in the April issue)

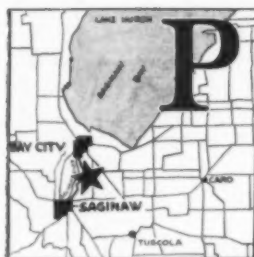


Bridge Across Cheboyganing Creek About Three Miles South of Bay City, a Cantilever-Type Bridge of Reinforced Concrete Construction

# Unusual Road Project in Michigan

By R. W. Roberts

Resident Engineer, Michigan State Highway Department, Saginaw, Mich.



PROBABLY the most unusual road construction project in the State of Michigan and the one which stands out alone as being entirely different from anything else ever attempted in that part of the country is the so-called River Road connecting the cities of Saginaw and Bay City. Both Saginaw and Bay City are located on the Saginaw River, a stream about 22 miles

in length formed by the junction of four other rivers, draining an area of 6,100 square miles. The Saginaw River has its mouth at the south end of Saginaw Bay, directly off Lake Huron and is navigable for vessels of 16.5 feet draft. The Saginaw River flows through the business sections of both Saginaw and Bay City and the shortest distance between these centers is along the river bank. In order to make navigation possible for the lake boats, it was necessary to deepen and widen the channel of the river. All of the land along the river is low, flat and only slightly above low water. An area of 38 square miles between the two cities is subject to floods which form a lake about 6.5 miles wide through which the river flows. Because of the topography and the frequent submergence of the land inside the flood district, all highways between Saginaw and Bay City were laid out far enough east or west of the river to be above the high water. This added from three to four miles to the distance between the cities.

## DREDGING RIVER CHANNELS

In 1910, the United States Government contemplated deepening and widening the channel for navigation. The dredging project was almost abandoned because of the distance excavation, removed from the river, would have to be transported to Saginaw Bay for wasting, when the idea was conceived that should the excavation removed from the river be deposited along the river bank, it could be used as the grade upon which a much-needed highway could be constructed. The right-of-way was obtained along the east bank of the river by Saginaw men and, in 1912, the Government let the contract for dredging the river. Of the dredged material,

about 600,000 cubic yards was deposited on the right-of-way along the river.

## ROAD PROJECT CONSUMMATED

For the subsequent 13 years the highway project was kept under consideration. There was much controversy over the feasibility and cost of the project and strong opposition was encountered. Finally in 1925, the promoters of the project succeeded in having the route adopted as part of the trunk line system of the State of Michigan, and also approved as a Federal Aid project. The contract for the construction of the grade was let to W. J. Meagher, of Bay City, in May, 1925, and work started immediately.

The estimated quantity of excavation to be handled under Meagher's contract was about 691,000 cubic yards, classified as follows: grading spoil banks from 1912 dredging, 53,000 cubic yards; dry land fill, 119,000 cubic yards; hydraulic fill, 501,000 cubic yards; removing of unsuitable material, 18,000 cubic yards.

## ADDITIONAL HYDRAULIC DREDGING

The State Highway Department, recognizing the scenic and recreational value of this project secured all of the marginal land between the roadway and the bank of the river and decided to build a 56-foot flat grade above high water at all times with side slopes of 4 feet horizontal to 1 foot vertical, thereby eliminating unsightly guard posts and guard rail and permitting parking on the roadside and the river front. This necessitated much more material along the river section, which is 7.2 miles of the 8.6 miles between city limits and accounts for the additional hydraulic work done under the highway contract. The hydraulic dredge is a development of some years and, therefore, is not a new excavating plant. The application of the hydraulic dredge to the construction of a road bed over marsh land is, however, a plan first brought into extensive practise on this job. The remaining 1.4 miles of the above-mentioned distance was dry land work, and the fill material was brought in from borrow ditches along the edge of the right-of-way by means of draglines. The grading and drainage structure work on both the river and dry land sections was practically completed in July, 1927.

The contractor began the hydraulic work with a

dredge having a 12-inch discharge. The river bottom was broken up by an agitator that loosened up the earth, which was then picked up by the suction of the pump. After passing through the pump this suspended material was forced through a pipe line from the dredge over the bank of the river to the right-of-way between dykes built to retain the solid materials within the limits of the grade. A trench machine was used to throw up the side dykes which were used the entire length of the river section, supplemented by metal sheets to prevent washing the dykes. Earth for these dykes was obtained by digging ditches inside the limits of the grade, and the material thus secured was piled along the side of the intended grade, leaving the ditches inside between the dykes.

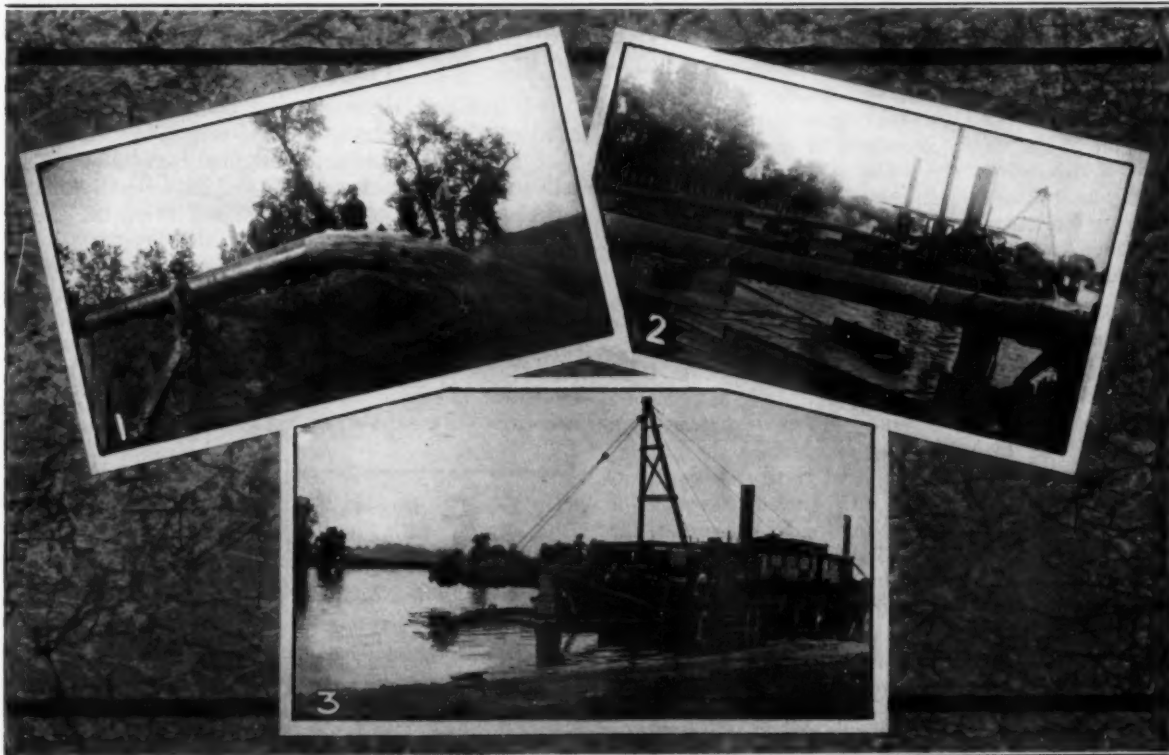
After the dykes were thrown up, the discharge pipe from the dredge was led between them and the pumps started. As the pumped material left the discharge pipe the earth was deposited near the end of the pipe line. The water in which the suspended material was carried flowed along between the dykes to the nearest spillway provided, and thence back into the river. As the fill between the dykes built up, sections of pipe were added, carrying the grade ahead until the length of pipe became too long. After this the dredge was moved and the process began again. After a short trial period, it was found that the 12-inch dredge would not handle the work at a satisfactory rate, and a new dredge having a 20-inch discharge was built by the contractor. The new dredge was built in a steel scow which had been constructed in 1923. Its rated pumping capacity

was 4,500 cubic yards per hour, of which 8 to 10 per cent was solid material. In addition to this, a 3-cubic-yard clamshell bucket on a 90-foot boom was attached for use in removing earth close to the shore line. The dredge was operated by steam and was equipped with two boilers, the swing and power engines being separate units. The agitator, made up of a conical series of cutting edges, was 6 feet in diameter and weighed about 7 tons. The depth to which the dredge could be operated was 27 feet below the water level. A 10-inch solid shaft was used to turn the cutting edges of the agitator. The hydraulic dredge was operated 24 hours a day. Living quarters were provided upon the dredge for the eight operators and the land crew, the dining-room being adequate for the service of 24 persons.

#### REMOVING MUCK

The waste section of the job was across a marsh about 1,000 feet in length. To get into the location a floating dipper dredge had to dig its way in from the river for a distance of about 500 feet. The muck lying across the center of the new line was dredged out and thrown over to the side, where it flowed away with the water and slumped down almost to disappearance. The trench made across the swamp in this way was then filled with good material pumped from the river and brought up to grade.

The north end of the job, the dry land section of 1.4 mile, was across a dyked farm. This was built up with two 1½-cubic-yard draglines having 90-foot booms. Material removed from borrow ditches was brought



#### DREDGING OPERATIONS ALONG THE SAGINAW-BAY CITY, MICHIGAN, ROAD

1. Close-up of the discharge from the hydraulic dredge. Pumped material was deposited between dykes thrown up from the ditches. The end of the pipe rests on top of one dyke. 2. Dredge in operation showing pipe line leading from pump to location of new grade on the river bank. 3. The 20-inch diameter discharge hydraulic dredge used in removing material from the bottom of the river. The agitator is shown lifted from the water and supported by cables.



up toward the center on both sides and later leveled down to form the grade. That part of the road lying over the old spoil banks of the 1912 dredging operations was balanced section and the ordinary methods of earth moving were used, steam and gas shovels, draglines, teams and scrapers, dump wagons and trucks all finding a duty in excavating and transporting the excavation necessary to make the smooth grade. The contractor maintained camps for men and stables for horses, as there is no highway or railroad crossing or intersecting this project.

#### DYKING AND TRENCHING

The road bed is built within a 200-foot right-of-way, and the specifications provided that there should be no ditches made or borrow from within the right-of-way, necessitating that dyking be made from within the road-bed area and then filled with the hydraulic material. The contractor's use of a 42-inch sewer-trenching machine in building the dyking for the hydraulic fill was a new and worthy application of trenching machines.

Metal sheets 4 feet wide and 6 feet long, with hand holes, were successfully used near the discharge of the dredge to prevent washing of the dykes. The shields were placed along the inside of the dykes and moved ahead as the hydraulic bank was completed.

The bed of the Saginaw River is generally blue clay, red clay and clay hardpan covered with sand, silt and loam washed down from the higher watersheds. The clay hardpan could not be successfully handled by the hydraulic dredge owing to the lack of power and the poor design of the agitator. The other materials agitated and pumped easily. The operations in sand were very successful and profitable, as the sand agitated easily, pumped with the maximum of solid material, built up in the banks, remained in place and showed little, if any, shrinkage. The silt and loam agitated equally as well as the sand, but, owing to the very fine particles, did not pick up effectively with the pump, did not pile up in the fill, and the loss over the spillways was too great.

#### SETTLEMENT AND SHRINKAGE

The writer hoped to gain some accurate data from this work as to earth shrinkage, particularly in hydraulic fill, but because of the diversity of the river excavation and subsidence of the ground upon which the fill was placed, little, if any, knowledge of earth shrinkage was obtained from the hydraulic fill. The fill was paid for in bank measurement. The dragline fill made from the side ditches from red clay indicated a swell of from 8 to 26 per cent. Since the fill was completed and graded there is apparent shrinkage or settlement of the fill, though it probably will not shrink back to within 8 to 12 per cent of the excavation volume. This was paid for in excavation, the volume of the ditches from which the fill was obtained being measured.

#### CONSTRUCTION PLANT

The contractor's plant consisted of the following equipment, part of which has already been mentioned in the article:

#### Water equipment:

- 3 scows
- 1 steam tug
- 2 gas tugs
- 1 launch
- 1 floating dipper dredge
- 1 12-inch hydraulic dredge
- 1 20-inch hydraulic dredge

#### Land equipment:

- 3 Northwest draglines
- 1 Austin trench machine
- 1 Thew shovel
- 1 Erie shovel
- 1 pile driver
- 1 20-ton tractor and Austin heavy grader.
- Teams, scrapers, dump wagons, trucks, etc.
- Subsistence camps and stables

#### BRIDGE CONSTRUCTION

Another necessary part of the construction was a bridge across Cheboyganing Creek, a stream emptying into the Saginaw River 3 miles south of Bay City. This contract was let to Willits Brothers of Bay City, in 1925, and the bridge was completed in the spring of 1927. This bridge is of the cantilever type, is built of reinforced concrete entirely, and consists of two 60-foot spans and one 90-foot span. Piles were necessary under the entire structure and difficulty due to high water was encountered. Materials for the bridge were brought in on a railroad which is adjacent to the highway grade at this point. The bridge was completed at a total cost of approximately \$74,000. The grading contract, which also included about 2,000 cubic yards of concrete in culverts, necessary for drainage, was let for approximately \$400,000. The completed grade has a top width of 56 feet, and is well above high water as set by the limits of any previous flood.

#### PROJECTED PAVING

It is now contemplated that a 40-foot concrete pavement will be laid within the next year or two over this road, bringing the project to its final completion. The estimated cost of this 8.5 miles of pavement is in the neighborhood of \$460,000, which will bring the entire cost of the completed project to about \$934,000.

The completed road cuts about 3½ miles from the distance between the two cities over the shortest route now being used. The road will provide a direct, easily maintained route for year-round traffic, both commercial and pleasure, between the two cities which it serves, benefiting all those who find it necessary to travel to and from the east central part of the state.

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*Frank B. Rogers, Vice Chairman of the Safety Committee of the New York Building Congress, at a meeting of the Congress, explained the early activity of the Building Congress in bringing to the attention of the industry the importance of safety prevention methods. He said that a committee of the Building Trades Employers' Association is studying the entire matter of safety and accident prevention in the building trades and that developments may be expected along this line soon. He emphasized the necessity of cooperation of the entire industry in this safety movement.*

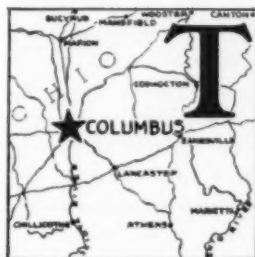
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# Handling a City Hall Job

By Scott Fullerton

Superintendent, Allied Architects Association of Columbus, Ohio, Ltd.



THE new Columbus, Ohio, City Hall in plan is a "U" shaped building, measuring 187 feet across the front and 150 feet along the side. It is located in the center of a city block facing the Scioto River, and the walls are of buff Bedford, Indiana limestone, backed up with brick, except for the court walls which are brick,

grading in color from a light shade at the bottom to a dark brown at the top.

## PREPARATION AND CONSTRUCTION OF FOUNDATIONS

The present Columbus City Hall site was formerly occupied by several manufacturing and commercial buildings having foundations with footings of varying sizes and depths. Some special tanks and pits went down to a considerable depth. The entire site having been purchased by the city was cleared of all buildings, notes being taken on the depths of foundations, etc. Sewer, gas and water mains had to be rearranged to avoid the foundations for the new building and where possible were dispensed with.

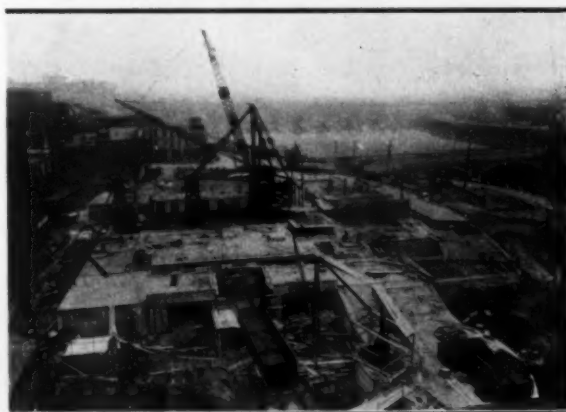
The soil on which the foundation for the building rests is for the most part sand and gravel. A steam shovel was placed on the job and the earth, along with old interfering foundations, was removed to a line established below the basement and tunnel floors. The column and wall footings were then excavated by hand, each footing being inspected and passed upon before any form work was placed to receive concrete. After the concrete footings were poured, dowels of reinforcing rods were placed about two feet apart, extending down the center of the footing to insure a good bond for the wall above.



Three Wooden Tripod Towers Shown for Mounting Steel Derricks to Handle Materials for All Parts of the New City Hall.

In laying out the building, the property lines were located and four center lines were run, establishing the main axis of the building and of the two wings. These lines which occurred in the center of the corridors were maintained throughout the building operation, all measurements being taken from them. This system of lines was scratched into the cement slabs on each floor as the building went up and was particularly helpful when the building was enclosed and the finish being installed as all crafts were required to work from them.

The driveway of approximately 20 feet in width ex-



First Floor of Columbus City Hall Poured. Note Railway Track in Foreground for Delivery of Material to the Site.

tends around the entire basement story. The walls of this driveway are from 12 to 18 inches in thickness and are made of reinforced concrete.

One large main tunnel extends across the entire building, located under the basement corridor. This accommodates all of the service lines for the building and extends to the heating plant across the street. Several small pipe tunnels supply the two wings of the building.

All the footings and connecting walls up to the basement floor line are concrete and amount to about 3,800 yards. A mixture of 1 part cement to 2½ parts sand and 4 parts of clean gravel was used. The proportions of the aggregate were varied as directed to produce concrete of the maximum density. In order to make the concrete work more easily and to give it some waterproofing qualities, hydrated lime to the extent of 5 per cent of the weight of the cement was used.

## STIFF LEG DERRICKS CUT LABOR COSTS

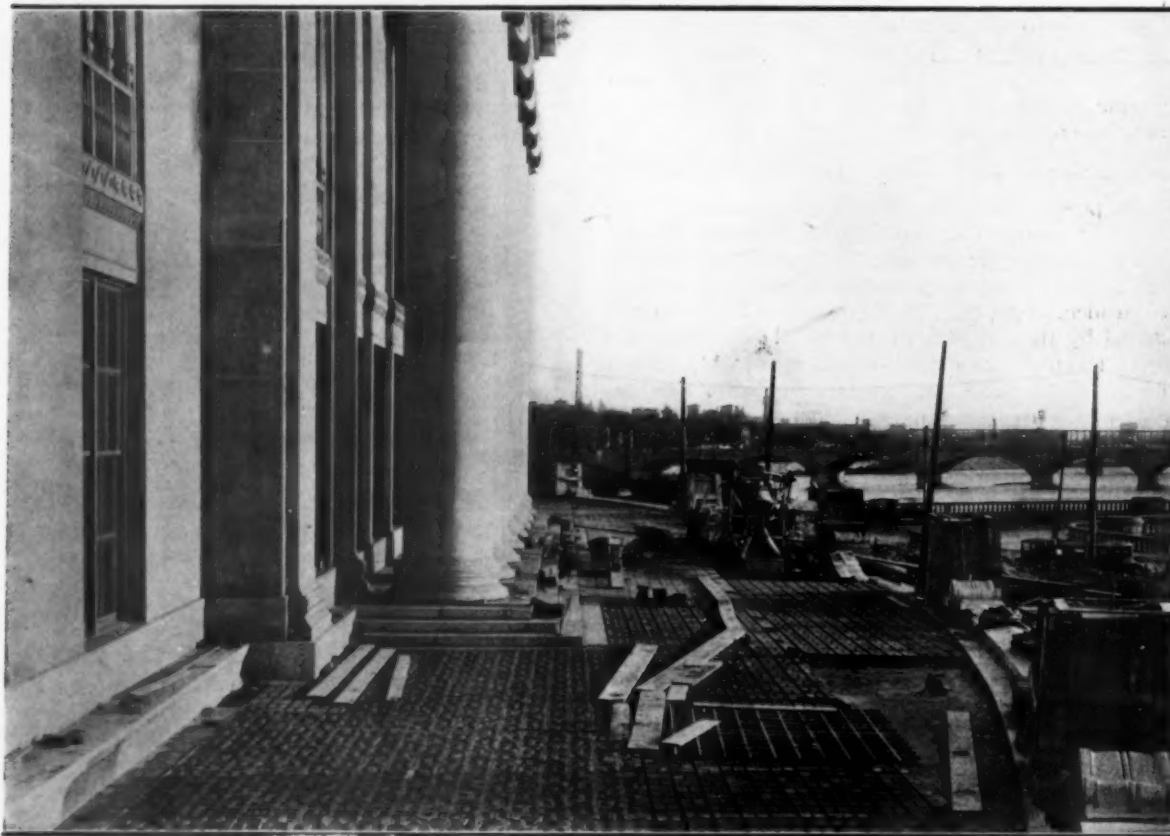
The central court is 74 feet wide and 93 feet deep. In this court, two stiff-leg derricks were located close to the front wall line and placed so that each could operate within a radius of about 180 degrees. The derricks each had a 110-foot boom and a 45-foot mast. They were set up 35 feet high on three wood bents or towers which had cables looped over them and fastened

to anchors in the concrete footings underneath. In addition to these cables, the bases of these wooden towers were weighted down with a carload of paving brick. These derricks each had a capacity of 4 tons at a radius of 110 feet and 6 tons at a radius of 90 feet. Most of the material for the job was brought in by carload lots, a railroad track being extended into one side of the site and within reach of one of the derricks. Material was deposited in the court by one derrick, and from there the other derrick could reach the farthest side of the building as desired. The masonry materials were handled in wood skips 5 feet square, and concrete was conveyed in one-yard steel hoppers. With two good engineers operating these derricks, the contractors,

flat car which ran on a track located at the proper level to allow them to be run under the mixer's spout. The depressed track enabled the derricks to pick up the hopper from either side of the mixer. This proved to be a very satisfactory layout as all the concrete floor slabs were poured direct from hoppers, except where some chutes had to be used at the two outside corners of the building.

#### SETTING STONE COLUMNS

In setting the eight large stone columns along the front elevation, an additional guide derrick was used. The shafts of these columns were made in three sections each, 10 feet long and 4 feet, 2 inches in diameter.



*Brick Paving on Terrace of the New Columbus, Ohio, City Hall Showing Grids Used to Form Uniform Spacing of Bricks*

Messrs. Boyajohn and Barr of Columbus, were enabled to reduce their labor costs to a minimum.

#### CONCRETE PLANT

The concrete plant was located at the center of the open end of the court. First, a concrete hopper was constructed in the ground back of the mixer to receive either truckloads of sand or gravel. This was conveyed by an endless chain into separate hoppers ready to be fed into the Koehring mixer from an operating platform above. A cement shed was located at one side, large enough to accommodate two cars of cement, and a runway was provided to convey the cement to the same operating platform where the mixer was filled. The concrete hoppers were placed by the derrick on a

They weighed about 10 tons each. The caps, bases and cornice stone were large pieces and required special care in handling. This derrick had a boom 70 feet long, constructed of two 14 x 16 timbers and jointed into a spider 4 feet square and a truss with steel rods. The mast was 55 feet high. This same mast was used first as a gin pole to unload the sections of the column caps, etc., from the flat cars on to skids, that in turn rolled to a point where the derrick could pick them up. This derrick was located at such a point that all the stone in the colonnade section could be placed from the original setup.

#### BRICK LAYING TERRACE PAVEMENT

One of the features of this building is a driveway



*The Structure Nearing Completion*

space which extends around the entire building at the basement level. Over this driveway, a cement slab supports a brick pavement some twenty feet wide, forming a terrace at the building. The slab, of course, had to be waterproofed and the brick pavement made as water-tight as possible.

The manner of laying the brick and grouting them in place was quite interesting. The brick is a hard red brick, laid flat in a basket-weave pattern on a rich bed of sand and cement. To place the brick, a wooden grid or form was constructed of  $\frac{3}{4}$ -inch material, 2 inches deep. This was of a convenient size, so that it could be easily removed after the brick had been placed in it. When the form was removed, the  $\frac{3}{4}$ -inch joints were left straight and true, ready to receive the concrete grout. The grout was kept evenly mixed in a cement mixer and poured into the joints by means of a sprinkling can with the nozzle removed. In order to protect the face of the brick from the cement stains, a layer of sand was sifted over the entire surface. The joints were allowed to set up sufficiently, so that the extra mortar and sand could be scraped off and then swept, leaving a clean job.

#### SELF-SUPPORTING STAIRWAY

One of the especially attractive features of this building is the circular marble stairway, leading from the first to the second story and landing at the corridor entrance to the council chamber. The material is gray, Carthage marble having a bone finish, the adjoining rusticated marble walls being polished.

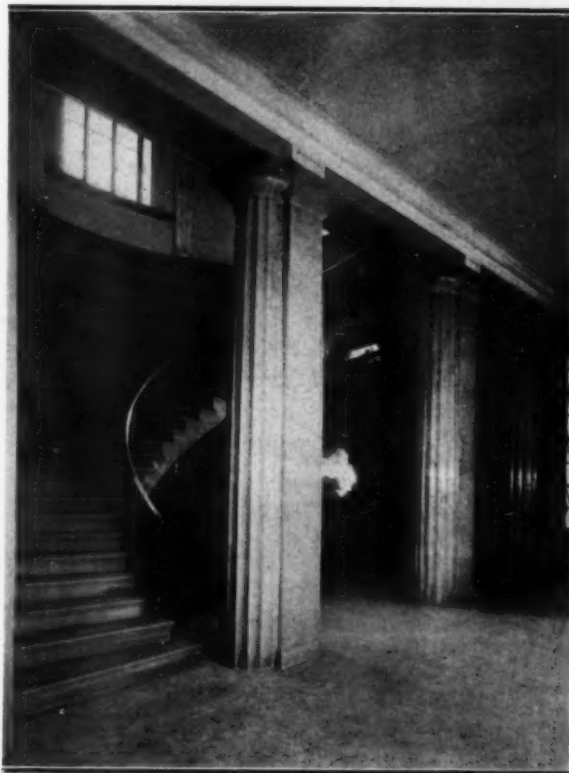
Each step is cut from one piece of marble, and the steps are doweled together with three  $\frac{1}{4}$ -inch brass pins to each step. They are also arranged so that they key into each other, forming a self-supporting slab. The outside ends of the steps have a flat bearing surface or lug 4 inches wide cut on them to secure a level, firm bearing. In most examples of this kind of work, the

steps extend several feet into the outside wall and are cantilevered out from it. In this case it was not possible to have a heavy outside wall, in fact the marble could only extend into the wall for a 6-inch bearing. To overcome this and to take care of any thrust that might occur, two  $\frac{3}{8}$ -inch steel cables were securely anchored at the bottom and top of the stairs and drawn up tightly with turnbuckles against the outside ends of the steps.

The two lower steps were cut from one piece of marble which was firmly bolted through the structural slab, and furnishes the start of the stairs. The steps were set in place on top of wooden shores, and when all were properly located, the steps between the ends and the outside course of brick in the wall, which also accommodated the steel cables, were grouted full with cement. The upper step was also grouted in tightly against the second-floor girder.

Each baluster of the wrought iron railing was let into the marble 2 inches and then leaded in place.

When the whole operation was completed and the shores removed, it left a very rigid piece of construction.



*The Complete Self-supporting Marble Stairway in the New Columbus City Hall*

### First Edition of Steel Handbook Issued

**T**HE first edition of the Standard Handbook of Steel Construction has just been published by the American Institute of Steel Construction, Inc. This Handbook contains 384 pages of data indispensable to the designer and specification writer. Its contents include the A.I.S.C. Standard Specification for Structural Steel for Buildings, the A. I. S. C. Standard Specification for Fireproofing Structural Steel Buildings, and the A. I. S. C. Code of Standard Practice.

There is also in this Handbook a large amount of additional information previously unobtainable in printed form, or obtainable only from widely scattered sources. Data regarding the new shapes recently produced by various rolling mills is complete up to the date of issue.

Copies of the Handbook may be obtained for \$1.50 at the office of the Institute, 285 Madison Avenue, New York, or from any members of the Institute.



# Who's Who in Construction

*A Series of Reports from Active Contractors Published Monthly*

## BUS. VOL.—ANNUAL VOLUME OF CONTRACTS

- A—Over \$5,000,000
- B—Between \$1,000,000 and \$5,000,000
- C—Between \$500,000 and \$1,000,000
- D—Between \$250,000 and \$500,000
- E—Under \$250,000

**B. M. Higginson, Inc., Newburgh, N. Y.,** 248 Broadway. Organized April 19, 1919. Bus. vol. D. Officers: B. M. Higginson, President. Major contracts: Newburgh Savings Bank, Newburgh, N. Y.; Epiphany College, New Windsor, N. Y.; three buildings for Crex Carpet Co., Newburgh, N. Y.; Burger Warehouse, Newburgh, N. Y.; West Street School, Newburgh, N. Y.; Pagenstecher Residence, Cornwall, N. Y.; and Otis Residence, Newburgh, N. Y. Member, Building Trades Employers Assn. of Orange Co., and A. G. C. of A.

**Ryan Brothers, Missouri Valley, Iowa.** Organized January 1, 1924. Bus. vol. E. This company was reorganized in 1924, after 12 years with T. Ryan & Sons. Officers: R. J. Ryan and F. B. Ryan, partners. Major contracts: Grading, Adams Co., Ill., Warren and Mercer Counties, Ill., Luccio Co., Iowa.

**Atkinson Construction Co., Los Angeles, Calif.,** 1315 Edwards Wilbey Building. Branch offices: 1013 Ray Building, Oakland, Calif. Organized August 3, 1926. Bus. vol. A. The company was started by Lynn Atkinson in 1916. Officers: Lynn Atkinson, President; Guy F. Atkinson, Vice-president; W. A. Kettlwell, General Manager. Major contracts: Cave Creek Dam, Phoenix, Ariz.; Macy Street Bridge, Los Angeles, Calif.; 40 miles of State Highway in Tehama County, Calif.; Sacatella Storm Drain, Los Angeles, Calif.; Los Angeles Outfall Sewer, Section 8, Los Angeles, Calif.; and in construction at the present time, the Pardee Dam at Valley Springs, Calif., for the City of Oakland; and the Coolidge Dam at San Carlos, Ariz., for the U. S. Government. Member San Francisco Chapter A. G. C. of A., Los Angeles Builders Exchange.



Boyd Portrait

Lynn Atkinson

**H. V. Snyder & Son, Battle Creek, Mich.,** 715 Post Building. Organized 1902. Bus. vol. D. Henry V. Snyder and Leon R. Snyder organized the business. At the death of Henry V. Snyder in 1915, Leon R. Snyder continued the business as manager and owner, under the original firm name. Major contracts: 1927, Battle Creek Bread Wrapping Machine Co. plant, Battle Creek, Mich.; Gage Printing Co. plant, and First Presbyterian Church, both of Battle Creek, Mich. Member Michigan Division A. G. C. of A., Associated Building Employers of Michigan, and Western Society of Engineers.

**A. A. Alexander, Des Moines, Iowa,** 503-05 Frankel Building. Organized 1925. Bus. vol. D. This company was originally Alexander & Higbie, operating from 1916 to 1925. Owner: A. A. Alexander. Major contracts: 1921-22, S. Side Sewer System, Des Moines, Iowa; 1926-27, State University of Iowa Power House and Heating Tunnels. Member A. G. C. of A.

**Leslie Colvin, Indianapolis, Ind.,** 823 Continental Bank Building. Organized 1912. Bus. vol. B. Mr. Colvin was formerly a member of the firm of Colvin & Anderson. Of-

ficers: Leslie Colvin, owner. Member, General Contractors Assn. of Indianapolis, Ind., A. G. C. of A.

**Carlson Construction Co., Marshalltown, Iowa,** 17 Woodbury Building. Organized 1915. Bus. vol. D. Officers: A. Carlson, President; H. R. Carlson, Secretary and Treasurer. Member, Associated General Contractors of America.

**T. C. Desmond & Co., Inc., New York,** 247 Park Avenue. Branch office: 342 Third Street, Newburgh, N. Y. Organized October, 1916. Bus. vol. B. During the past eleven years,



T. C. Desmond

this company has executed, as general contractors, more than \$50,000,000 worth of construction contracts of a very varied nature including: construction of shipbuilding plants, apartment houses, factories, office buildings, store buildings and large general housing developments with incidental streets, roads, sewers and water supply systems, etc. Officers: Thomas C. Desmond, President; G. W. Burnham, Secretary & Treasurer. Major contracts: 1924, Park-Lexington Building, New York. (A \$2,500,000 twenty-story office building presenting unusual construction difficulties since it was built over the New York Central R. R. tracks in the block between 46th and 47th Streets.) 1925 and 1926, Sunnyside Gardens Housing Development, Long Island City, N. Y. (A \$7,000,000 general contract including houses for 650 families with all incidental work, also, such as construction of sewage system, water supply system, paving of streets, etc.) Member New York Building Congress and the American Construction Council.

**File & Collins, Decatur, Ill.,** 253 South Park. Organized April 1, 1922. Bus. vol. D. This company was established in 1912 as File & Alexander. Officers: Forrest File and Wm. H. Collins, partners. Major contracts: 1925, Intercepting Sewer & Tunnel for the Sanitary District of Decatur, and municipal paving projects; 1926, Water Filtration Plant, Decatur, and municipal paving projects; 1927, Sewage Disposal Plant, Decatur, and municipal paving projects. Member A. G. C. of A. and Illinois Assn. Highway and Municipal Contractors.

**Aberthaw Co., Boston, Mass.,** 80 Federal Street. Organized 1923. Bus. vol. A. This company was originally organized in Maine, in 1894, as the Aberthaw Construction Co., and was changed to a Massachusetts charter in 1916, changing its name to the present one in 1923. Officers: Leonard C. Wason, President and Treasurer; Edward H. Temple, Jr., Vice-president and General Manager; Stanley L. MacMillan, Secretary and Manager of the Marine Dept. Major contracts: This company specializes in industrial, hydro-electric and water front construction and engineering work, the following being some of the concerns with whom this company has recently had contracts: Manville-Jenekes Co., United Shoe Machinery Corp., Standard Oil Co. of N. Y., The Aeolian Co., American Hardware Corp., The Columbia Mills, Inc., International Harvester Co. of America, Mallory Hat Co., Hood Rubber Co., Packard Motor Car Co. of N. Y., Bird Machine Co., Cheney Brothers, American Soda Fountain Co., Rumford Chemical Co., Walter Baker & Co., and Forbes Lithograph Mfg. Co. Member A. G. C. of A., Master Builders Assn. of Boston.



**H. B. Sproul Construction Co., Scranton, Pa.,** 7 Olive Street. Branch office: Clarks Summit, Lackawanna County, Pa. Organized 1914. Bus. vol. C. The business was started in 1905 as Hinman & Sproul. In 1908, the business was taken over by Harvey B. Sproul, and was incorporated as the H. B. Sproul Construction Co. and the Sproul Supply Co. in 1914. The two companies were consolidated in 1926. Officers: Harvey B. Sproul, President and General Manager; Herbert M. Unaugst, Secretary and Treasurer. Major contracts: Trans County Road through Lackawanna County of sheet asphalt construction on a concrete base. A large part of the work of this company is for privately owned estates and corporations. Member, Associated Pennsylvania Constructors.

**S. M. Siesel Co., Milwaukee, Wis.,** 160 Ogden Avenue. Branch office: 406 Forbes Building, Pittsburgh, Pa. Organized June 12, 1922. Bus. vol. B. This company took over the personal business of S. M. Siesel who had been operating as an individual since 1917. Officers: S. M. Siesel, President and General Manager; Wm. F. Kachel, Secretary and Treasurer. Major contracts: 1925, Plankeinton Arcade Building Additions, Milwaukee, Wis.; 1926, Evangelical Lutheran Church, Pittsburgh, Pa.; 1927, Ridgely-Farmer's State Bank, Springfield, Ill., and Garfield, Kenosha Orpheum, Uptown, and National Theatres, Milwaukee, Wis., and other buildings. Member, Builders and Traders Exchange, Milwaukee and Pittsburgh, Association of Commerce, Milwaukee and Pittsburgh and A. G. C. of A.

**The Utah Construction Co., Ogden, Utah.** Branch office: 526 Phelan Building, San Francisco, Calif. Organized 1900. Bus. vol. A. Officers: W. H. Wattis, President; E. O. Wattis and A. H. Christensen, Vice-presidents; W. L. Wattis, Secretary and Treasurer. Major contracts: 100 miles railroad construction for Union Pacific Co., 100 miles railroad construction for Southern Pacific R. R. of Mexico, American Falls Dam, Guernsey Dam, and Gibson Dam, for the U. S. Bureau of Reclamation. Member, A. G. C. of A.

**Christy-Dolph Construction Co., Dallas, Texas,** 721 Const. Ind. Building. Branch office: 815 Rule Building, Amarillo, Texas. Organized June 1, 1919. Bus. vol. B. Officers: L. A. Christy and G. E. Dolph, partners. Major contracts: 1925, High School and Negro Elementary School, Cameron, Texas; First Baptist Church and Sunday School, and Munger Place M. E. Church, Dallas, Texas; 1926, Washington Hotel and Greenville Exchange National Bank, Greenville, Texas; 1927, Jefferson Drug Warehouse, Beaumont, Texas, Polk St. M. E. Church and St. Anthony Hospital, Amarillo, Texas. Member, A. G. C. of A.

**Hoolihan & Wangler, Dayton, Ohio,** Riverview Avenue. Organized May, 1923. Bus. vol. E. Major contracts: Street paving in City of Dayton, and Montgomery Co., Ohio. Member, A. G. C. of A.

**John W. Ferguson Co., Paterson, N. J.,** 152 Market Street. Branch office: 40 West 40th Street, New York. Organized 1892, incorporated 1903. Bus. vol. B. Officers: John W. Ferguson, President; Joseph Sanworth and James A. Burbank, Vice-presidents; R. G. Hughes, Secretary; A. D. Ferguson, Treasurer. Major contracts: 1925, Nelson House (hotel), Poughkeepsie, N. Y., Benj. Moore & Co. factory, Newark, N. J., Jersey City Printing Co. manufacturing building, Jersey City, N. J., Paterson General Hospital, Paterson, N. J., and Homeopathic Hospital of Essex County, East Orange, N. J.; 1926, Proctor & Gamble Co., "Crisco" plant, Port Ivory, Staten Island, N. Y., Telephone Co. exchange, Paterson, N. J., and R. H. Muir, department store, East Orange, N. J.; 1927, Jacob Fabian Theatre, in Jersey City, and Hoboken, N. J., and F. W. Woolworth Co. store and office building, New Haven, Conn. Member, Building Trades Employers Association of New York.

**A. F. Johnson Construction Co., Minneapolis, Minn.,** 747 Plymouth Building. Bus. vol. C. Officers: Algot F. Johnson, sole owner. Major contracts: Paving work only; 1927, 20 miles of paving from Morrhead to Hawley, Minn.; 25 miles of paving in Fayette Co., Iowa, contracted for 1928. Member, A. G. C. of A.

**Wichita Construction Co., Wichita, Kans.,** 311 4th National Bank Building. Organized 1915. Bus. vol. D. From 1905 to 1909 this company operated as Hammond Bros. Construction Co., from 1909 to 1912 as The Hammond Construction Co., and from 1912 to 1915 as R. B. Hammond, contractors and builders, when the present company was formed. Officers: R. B. Hammond, owner. Major contracts: 1925, Friends University Church; 1926, Kansas State Teachers Music Hall; 1927, Chevrolet Home, and many other buildings. Member, Sedg. Co., Master Builders Club, Kansas Master Builders Assn., and A. G. C. of A.

**J. J. McDevitt Co., Charlotte, N. C.,** 505 Builders Building. Organized July 1, 1925. Bus. vol. B. In 1917, Mr. McDevitt operated in Chattanooga, Tenn., as an individual. In 1919, a partnership was formed with H. G. Fleming of Chattanooga, and in 1925 the present company was incorporated. Officers: J. J. McDevitt, President; C. P. Street, Secretary.

**Greenleaf Construction Co., Rock Island, Ill.,** Mosenfelter Building. Organized January, 1923. Bus. vol. E. Officers: H. Greenleaf, sole owner. Major contracts: 1926, Masonic and Eastern Star Home, Rock Island, Ill.; 1927, refrigeration plant, Keokuk, Iowa, for Swift & Co. and poultry station, Carthage, Ill., also for Swift & Co., and Elementary School, Rock Island, Ill. Member, A. G. C. of A., and Tri City Building Construction Employers Assn.

**W. Jay Burgin, Long Beach, Calif.,** 1100 Redono Avenue.



W. Jay Burgin

Organized 1907. Bus. vol. E. Officers: W. J. Burgin, owner and manager. Major contracts: 1925, building construction aggregating \$127,700; 1926, building construction aggregating \$63,000; 1927, Anchor Building & Loan Office Building, warehouse for Rotary Oil Well Cementing Co., garage for Continental Baking Co., and bakery for Continental Baking Co. Member, Builders' Exchange, and Southern California Branch of A. G. C. of A.

**Hughes-Foulkrod Co., Philadelphia, Pa.,** 1505 Race Street. Branch office:

421 Seventh Avenue, Pittsburgh, Pa. Organized March, 1916. Bus. vol. B. Officers: W. R. Hughes, Jr., President; F. S. Foulkrod, Secretary and Treasurer. Major contracts: Artificial silk plant for the American Bemberg Corporation; artificial silk plant for the American Glanzstoff Corporation; freight car repair shop, Reading Co.; perishable freight terminal, B. & O. R. R. Co.; dock of Kennebec River Bridge, Bath, Me.; strip mill, Wierton Steel Co. Member, A. G. C. of A.

**O'Neil Construction Co., Leavenworth, Kans.,** 119 Fourth Avenue. Organized January 1, 1912. Bus. vol. E. This company specializes in the following lines of work: sewers, sewage disposal, water-works and water purification. Officers: Joseph O'Neil, President; Edward P. O'Neil, Secretary and Treasurer. Major contracts: 1925, Water-works systems at Bloomfield, Mo., and Fredericktown, Mo., and sewer systems at Jackson, Mo.; 1926, Water-works systems at Winchester, Kans., and sewer systems at Higginsville, Mo.; 1927, water-works systems at Mansfield, Mo., and Effingham, Kans., and sewer systems at Ruston, La., and Rolla, Mo. Member, Rotary International, Kansas Contractors Assn., and A. G. C. of A.

## Standardization of Replaceable Cutting Edges Opposed

SINCE the publication in the January issue of *CONTRACTORS AND ENGINEERS MONTHLY* of an article on the proposed standardization of replaceable cutting edges as investigated by the Division of Simplified Practice of the U. S. Department of Commerce, that Department has had considerable opposition, chiefly from manufacturers, to this proposal for standardization of replaceable cutting edges for grading machines, road maintainers and steel drags.

According to R. M. Hudson, Assistant Director, Commercial Standards, Department of Commerce, the investigation was prompted by an inquiry which the U. S. Bureau of Public Roads received from the Missouri State Highway Department suggesting this simplification. Inquiries were made among the several state highway departments and also the various manufacturers of this class of road machinery, as well as distributors, industrial users, etc. The state highway departments were practically unanimous in their desire to see this simplification accomplished. Of the manufacturers, 29 were definitely favorable to the proposal, 11 favored it "in principle," and 3 were doubtful or opposed.

The chief opposition to this proposal has come from the manufacturers. According to C. O. Wold, President of the Road Machinery Manufacturers Association, six manufacturers, who represent 75 per cent of the road grader production of all types, have expressed themselves as opposed to the adoption of a standard for various reasons. One of these manufacturers points out many disadvantages and burdens which he feels the proposed standardization would impose on his industry. He suggests that the various state highway departments "unite on a standard punching for all blades on machines purchased by them in the future, and make their specifications accordingly, or if they can't agree, let each one have its own standard of punching on all the different machines it purchases." This solution to the difficulties of the American Association of State Highway Officials, has been sent to their President, Frank T. Sheets, and may solve their problem.

The question has likewise been taken up with the American Road Builders' Association, which, it is said, is referring it to its Manufacturers' Committee.

Since the adoption of simplification practices depends for its success on the willingness of all parties—manufacturers, distributors, and consumers of a specific commodity—to come together and agree on a program which they all feel will be of mutual benefit, it is doubted that anything will be done in the matter, as it stands. In the preliminary stage of any project, the Division of Simplified Practice of the Department of Commerce, acts merely as an agent to investigate a proposal, obtain various viewpoints, compile them and present them to the various groups interested and the group which made the initial suggestion. It has no power to bring about any decision in the matter and only desires to cooperate on any subject and submit its investigatory reports. While this Division does not expect to find simplification applicable in every industry, on the other hand, it has found that there are many manufacturers who find Simplified Practice helps them to save in their purchases of shop supplies, etc., as for instance, the Simplified Practice Recommendation No. 45, for grinding wheels, and the Simplified Practice Recommendation No. 36, for milling cutters.

This Division, under the guidance of its Planning Committee, of which A. W. Shaw, formerly Chairman of the Conservation Division of the War Industries Board, is a very active member, has thus far been helpful in the reduction of waste. It is the purpose, function, and desire of this Division, to help industry reduce its burdens, and to give any business group, private or public, its opportunity as purchasers, to inquire into the possibilities for simplifications that they feel will be an economy to them.



*Ninian Jamieson, President, Associated General Contractors of Westchester County, Presenting the Safety Trophy Awarded to Frank N. Goble Co., Inc., White Plains, N. Y., to William F. Tubising, President*

## Frank N. Goble, Inc., Receives Tubising Safety Trophy

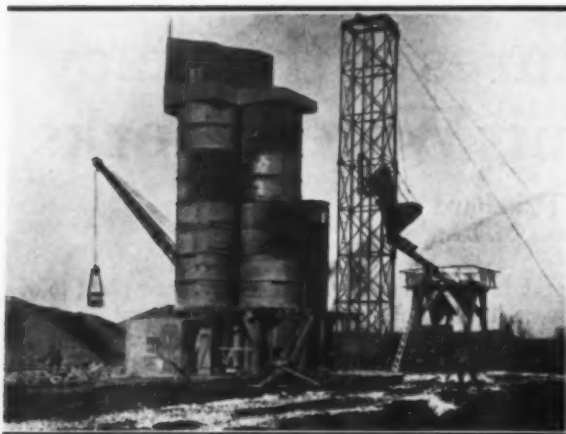
THE William F. Tubising award given to the member of the Associated General Contractors of America having the least loss of time during 1927 in ratio to the gross working hours, was presented by Ninian Jamieson, President of the Associated General Contractors of Westchester County, N. Y., to William J. Goble, President of Frank N. Goble Co., Inc., White Plains, N. Y., at a recent meeting. For the six months ending December 31, the Goble organization had an average of 140 employees working a total of 134,366 hours and during this period there were but three accidents causing the loss of time.

William J. Goble has been appointed by the Associated General Contractors of America on its Committee of Accident Prevention to serve for the year 1928. This company has always taken an active interest in safety methods and to this end one of the monthly shop meetings each season is devoted to the interests of safety methods and accident prevention. Among the films shown at the meetings have been those sponsored by the U. S. Bureau of Mines, such as "When Wages Stop" or "Safety First in the Petroleum Laundry," "Live and Let Live," and "Safety or Sorrow." A talk by the safety engineer of the insurance carrier covering the State Workmen's Compensation Law, its purpose, development and method of operation, current changes and improved methods for the prevention of accidents has been included, as well as a demonstration in first aid to the injured by a troop of the Boy Scouts of America, covering the handling and transportation of the injured, bandaging and treatment in case of typical accidents.

A novel method has been adopted by the company in always having the first aid kits in good shape and always properly filled. Each superintendent and foreman has been given a Johnson & Johnson cabinet inscribed with his name and this he carries with him from job to job. The result of this personal touch has been marked, for each superintendent and foreman takes pride in having his kit constantly available, clean and well stocked. The cumulative result has been a reduced number of accidents and loss of time, resulting in an experience credit rating granted by the State Rating Board of the Insurance Department.







*The Central Mixing Plant at Olivette. Note the Storage Bins Built up of Old Beer Vats*

property bordering the Olive Road on the north, the Bonhomme Road on the east and the Warson Road on the west. This property is large enough to accommodate the present basin and have ample room left for a duplicate of this when it becomes necessary. The water level in the finished basin will be carried at an elevation of 317, which represents a static head of about 300 feet on the high service pumps at Howard Bend, and about 190 feet at the connection with the present distribution system.

#### THE BASIN

Stacy Park Basin is a reinforced concrete structure about 600 x 800 feet in plan and about 33 feet deep. The north, east and west walls are buttressed on the outside with buttresses extending to the outer edge of the footing and 10 feet 4 inches on centers. The total height of the wall, from the bottom of the footing to the top of the coping, is 38 feet 10 inches. The south wall is buttressed on both sides with a footing width of 34 feet. The reason for this is that the south wall will eventually serve as a division wall between two basins, and was therefore designed for full water pressure on

one side with the other basin empty. The other walls were designed for an earth fill behind the wall, the total height of the wall with a horizontal berm on a level with the coping out to the edge of the footing, and then sloping off on a 3 to 1 slope.

The basin is to be covered, as it is to be used for the storage of filtered water. The roof is a 4-inch concrete slab designed as a two-way beam and slab roof, with beams carried on columns 16 feet 6 inches on center. There are altogether 1,724 columns supporting the roof. The outer span of the roof slab rests on the wall coping and is arranged to slide with expansion and contraction due to temperature. The roof is sloped so gutters poured integral with the walls from which the roof runoff is carried away by a cast iron drainage system.

#### FLOOR CONSTRUCTION

The floor of the basin is a 6-inch reinforced concrete slab with expansion joints in both directions every 99 feet. Expansion joints were also built around the column footings and at the joint between the basin bottom and the wall footings.

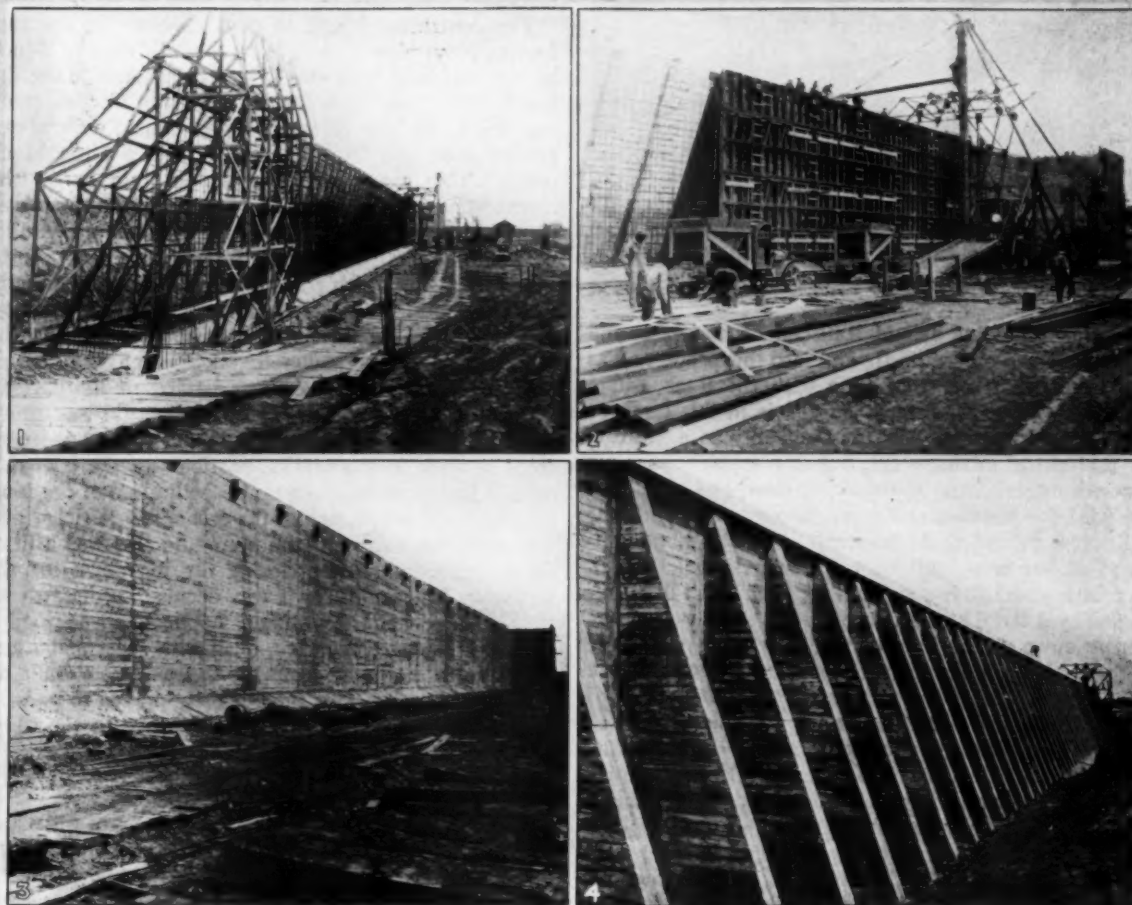
#### FILLING CHAMBER

At the southwest corner of the basin is located the filling chamber. This chamber is covered with a small rubble masonry gate house with a high peaked roof. While only one pipe line is connected at present to the filling chamber, provision has been made for three such lines which will eventually be built when the Howard Bend plant is developed to its ultimate capacity. The building over this chamber houses the operating stands for the sluice gates, both for the incoming lines and the connections to the basins. The sewer connection to drain the basin is also located in conjunction with the filling chamber and the entire bottom of the basin has a slight fall toward this point. A similar chamber in the southeast corner takes care of the connection from the basin to the pipe line which leads to the city mains. This is similar in design to the filling chamber, but is not housed over.

The deepest cut necessary in the excavation of the



*Portable Ramp Used in Pouring the Main Wall Footings. Note the Hopper Body on the Truck*



VARIOUS STAGES OF CONSTRUCTION OF 60-FOOT RESERVOIR

1. Reinforcing steel in place before setting the 60-foot steel wall forms. 2. Pouring wall, showing trucks, ramp, Insley skip hoist and Blaw-Knox steel forms. 3. Inside of completed wall showing lugs for beams. 4. The back or outside of the completed wall.

basin site was 21 feet. In two localities, one under the east and one under the west wall, the surface of the ground for short distances was lower than the bottom of the footing, and in these localities the level was brought up to the bottom of the footing with Class B concrete, the maximum thickness of this being about 4 feet.

#### TRENCHING FOR FOOTINGS

The first operation in the actual construction of the reservoir was to excavate a trench for the east footing. This was done with crawler cranes operating either draglines or clamshell buckets, and the earth was piled outside of the finished footing line to serve as backfill behind the finished wall. Comparatively little excavation was done before the construction of the walls, besides the footing trench, and the working space parallel thereto. Excavation was all in sound yellow clay, which furnished an excellent foundation for the walls. Frequent borings made along the line of the walls indicated hardpan about 9 to 14 feet below the bottom of the footing, hardpan being underlain by a sound shale. After excavating the footing trench a cut-off wall of Lackawanna sheet piles, weighing 38 pounds per linear

foot, was driven through the hardpan and about 6 inches into the shale. These piles varied from 9 feet 6 inches to 18 feet 6 inches in length and formed a continuous cut-off wall around the entire basin. All piles were driven with a No. 7 McKiernan-Terry pile hammer suspended from the boom of an Industrial crane on a crawler mounting. Steam was furnished by a small portable boiler mounted on skids, which was hauled along as the pile driving progressed.

#### CENTRAL MIXING PLANT

The nearest railroad connections to Stacy Park Basin are the Rock Island connections at Olivette, about a mile and a half east of the basin on the Olive Road, and at Lackland, about the same distance north on the Link Road. The contractor was faced with the necessity of either building an industrial track from the railroad to a mixing plant at the reservoir site, hauling concrete material in by truck, or erecting a central mixing plant at one of the railroad connections and trucking ready mixed concrete to the job. The Frazer-Davis Construction Co. of St. Louis, which was the successful bidder, chose the latter alternative and erected a central mixing plant at Olivette. A tract of land was leased



*Earth Conveyor for Removal of Excavation from Within Basin*

bordering the Rock Island Railroad on the east, and the Olive Road on the north, and into this property was built a switch track connecting with the Rock Island Railroad. There were several leads from this track to serve the yard, which was used not only as a location for the central mixing plant, but as a storage space for concrete material and re-enforcing steel, and as a casting yard for pre-cast columns. The mixing plant was built close to one of the switch leads. This plant consisted of five bins built up of circular sections of old beer vats, about 10 feet in diameter, which had been discarded by a large brewery in St. Louis shortly after the closing down of the brewing industry in 1919. Three of these bins contain cement, one sand and one gravel. The cement bins have a capacity of 500 barrels of cement each, and the sand and gravel bins 60 yards each. These bins were erected on a heavy timber platform about 10 feet above track level. Cement was received by the carload in bulk, unloaded by a General Conveyor Co. power shovel and elevated into the bins by means of a bucket elevator. Sand and gravel were unloaded by a crane and clamshell bucket, either directly into the sand and gravel bins or on to stock piles alongside the track. In operating the plant, cement was drawn from the bottom of the bin, weighed and delivered into the mixer. Sand and gravel were measured by volume in measuring hoppers. The mixer, a 1½-yard Smith tilting mixer, was located at ground level and discharged into an Insley skip hoist, which elevated

it to such a height that it could be dumped into motor trucks.

The contractor began to pour concrete in the east footing November 17th, 1925. A plank road of 3-inch boards was laid from the Olive Road south along the inside of the east wall footing. A large wooden ramp was built, the top of which was about 5 feet above ground level and large enough to hold a 5-ton Mack truck. This ramp carried a hopper into which the trucks emptied their load of concrete. The ramp was furnished with wheels so that it could be moved parallel with the footing. The hopper discharged directly on to a belt conveyor which transported the concrete directly into the footing. This arrangement was quite successful, and was used throughout the job for pouring the footings. The first concrete taken from the central mixing plant to the basin was hauled in flat-bottom, end-dump, steel bodies. These bodies did not prove successful, as there was a great tendency for the concrete to stick in the trucks, particularly the lean mix used to bring the subgrade up to the bottom of the footing under a short stretch of the east wall. A richer mix was tried out using an admixture and this was a little more successful. After closing the job down for the winter in January 1926, it was decided to discard the steel bodies, and accordingly hopper-shaped wooden bodies of 1½-yard capacity, lined with sheet metal and arranged to discharge from the bottom, were built on the truck chassis. This type of body proved to be very successful, and was used in connection with the ramp for the pouring of all footings and walls.

#### WALL FORMS

Excavation, pile driving, and the pouring of walls and footings were carried on more or less simultaneously throughout the job. In pouring the walls, a special set of Blaw-Knox forms was designed and erected. These forms were 60 feet in length, and were designed to pour a 60-foot section of wall, the entire height of the wall in one day's pour. This necessitated the erection of all wall reinforcing steel complete before the erection of the forms. The forms were moved by a steel gantry running on tracks on either side of the wall. After a



*Stacy Park Basin Showing Floor, Precast Columns and Roof in Place*



section of wall had been poured, and a sufficient time had elapsed for set, the forms were loosened and jacked out from the wall and suspended by tackles on the trusses of the gantry crane. The entire crane was then moved forward along the track the necessary distance and the forms dropped back in place and tightened up and made ready for the next pour. The forms were held together by  $\frac{3}{4}$ -inch threaded rods which screwed into cast iron conical nuts which projected into the concrete, and which were attached to the studding of the forms to prevent spreading. After the removal of the forms, these conical nuts were unscrewed from the tie rods and the resulting depression, about 2 inches deep, filled with mortar. By this method, no wall tie reached the surface of the wall. In pouring the wall, a ramp

the deposit of surplus earth. Out of the total of 209,000 cubic yards of dirt removal, this was all that could be wasted as the remainder was needed for backfill around the outside of the walls. With the completion of the east and north walls, the backfill behind the east wall was undertaken. A long belt conveyor of the General Conveyor & Manufacturing Co., St. Louis, Mo., had been manufactured about 100 feet long, driven by a gasoline engine and mounted on rollers, so that it could be moved in either direction. This conveyor was long enough and inclined at such a slope that the belt conveyor carried dirt over the wall and dropped it on the fill outside. A wooden ramp was built at the inside end of the conveyor, containing a trap. Bottom-dump wagons, which had been loaded by the elevating grader,



*Pouring the Roof of the Stacy Park Basin Showing Trucks with Hopper Bodies on Wooden Runways for Concrete Buggies*

was used similar to that used for the footing, except that concrete was fed into the bucket of an Insley mast hoist, which elevated it to the top of the wall. The wall was 2 feet 6 inches thick at the bottom and 1 foot 8 inches thick at the top. It was always possible to have tampers inside the wall forms to handle the concrete. The hoist dumped directly into spouts which carried the concrete down into the wall forms with practically no free drop, thus avoiding separation of the concrete by striking the reinforcing steel. The resulting job from this method of construction has been very satisfactory. Honeycomb has been almost eliminated entirely. The maximum stress on a wall of this description is produced with the basin empty, and the backfill in place behind the wall. This condition has obtained on these walls for considerably over a year. Because of the exceedingly wet Fall of 1926 and the rainy Spring of 1927, part of this fill has been so saturated that the resulting pressure has been almost a hydrostatic pressure, and there has been no leakage apparent either in the wall or in the construction joint between the wall and the footing. The walls were started about May 1, 1926, and completed about December 1 of the same year, there being a total of 23,000 cubic yards in walls, footings and chambers.

#### EXCAVATION FROM WITHIN RESERVOIR

While the construction of the east and north walls was in progress, considerable earth was being removed from the basin by a Russell tractor-drawn elevating grader discharging into bottom dump wagons. About 35,000 yards of earth were wasted outside the basin to the west in a depression which made an ideal site for

drove up on the ramp and dropped their loads, which were fed on the belt and carried over the wall. In all, this conveyor handled about 175,000 yards of excavation, which was enough to make a backfill behind the wall with a berm at the top at the elevation of the wall coping, about 20 feet wide and sloping at a 3 to 1 slope down to the original surface of the ground.

#### ROOF COLUMNS

The specifications under which the job was built permitted the use of either precast columns for the basin roof, or the pouring of these columns in place. The contractor elected to precast these columns and erect them in previously prepared pocket footings. This scheme worked very successfully. Forms for the columns and for the cross braces which connected the columns in groups of 4 at about half-way between the floor and roof, were built in the storage yard at Olivette. The columns were permitted to set about a week after being poured and were then picked up by a crawler crane and stored until ready for use. After completion of the outside walls, the erection of these columns was undertaken. The footing consisted merely of a reinforced concrete box, the pocket left to receive the column being 2 inches larger than the column. Both the roof and the floor are sloped to take care of drainage. To avoid complications in form building, all columns were cast of the same length, and the difference was made up in the elevation of the bottom of the footing. The columns were transported from Olivette to the basin by motor trucks, each truck carrying two columns on a specially-built out-rigger, one on either side of the truck body. The truck was driven into the basin

through an opening on the northeast corner, the columns picked up by a crane and set in place in the footing. The column was very carefully lined and plumbed and held in place by wooden wedges while grout was poured between the side of the footing and the column. The precast cross braces were then set in place on a bracket cast on the column. The columns were cast with 2 pieces of reinforcing steel projecting out at an angle to connect up with corresponding reinforcement which projected from the cross braces. These reinforcing rods were afterwards welded together, as described in *CONTRACTORS AND ENGINEERS MONTHLY* of December, 1927, and the rods finally enclosed in a fillet of concrete. This method of handling the columns proved to be very successful.

#### ROOF CONSTRUCTION

Near the top of each column were cast two brackets which were used by the contractor to support the roof forms. These brackets were cast with inserts in them which afterwards received flanged rollers. The roof forms were also Blaw-Knox forms supported on trusses which moved on these rollers on the columns. The roof is supported by beams running in both directions between columns with a center to center span of 16 feet 6 inches. The beams are 12 inches wide by 16 inches deep, and the roof slab 4 inches thick. Enough roof forms were provided to pour a section of roof 100 feet wide by 300 feet long, which meant that the north half of the basin could be poured in 8 sections and then the forms shifted to the south half, which completed the roof, the basin being 600 feet wide. After pouring a section 100 x 300 feet and permitting it to set the requisite amount of time, the forms were dropped low enough by means of jacks to clear the bottom of the beams, then the entire set of forms was moved forward with the supporting trusses bearing on the rollers fastened to the column brackets. Upon moving out 100 feet the forms were jacked back to level, cleaned up, reinforcing steel set and the slab again poured. The roof slab was started December, 1926, and finished December 7, 1927, and contained 7,800 yards of concrete. All concrete for the roof slab was hauled from the central mixing plant in pneumatic tired Chevrolet trucks with a special wooden, hopper-shaped body having a capacity of about  $\frac{3}{4}$  yard. These trucks reached the top of the wall on a plank road laid up from the Olive Road. The concrete was handled from the truck in 2-wheeled buggies and wheeled in the place. As the roof progressed westwardly from the east wall, plank runways were built directly over a line of beams, over which the trucks ran until they reached the portion of the roof being poured and then discharged into the buggies which transported it to place.

#### EXPANSION JOINTS IN BOTTOM

About  $\frac{1}{3}$  of the north half of the roof was poured before the construction of the concrete bottom was undertaken. The bottom slab is a reinforced concrete slab 6 inches thick, with expansion joints dividing the slab up into squares, 99 feet across. Expansion joints were constructed by thickening the bottom slab to 10 inches for a distance of 2 feet 6 inches on either side of the joint. A  $\frac{3}{4}$ -inch joint was left between the slabs. A depression 3 inches deep and 1 foot 6 inches on either side of the expansion joint was formed in the top of the

slab, which thus maintained a thickness of slab of 7 inches immediately at the joint. The joint was then filled with asphalt and the bottom of the 3-inch depression was mopped with asphalt and waterproofing fabric. The depression was then filled with concrete up to the general level of the bottom slab, and the joint between this new concrete and the side of the 3-inch depression also filled with asphalt. Similar joints were constructed where the basin bottom rested on an offset in the wall. All concrete in the bottom was poured with the same type of truck used for the roof.

All work inside the basin was handled through an opening about 20 feet wide in the wall in the extreme northeast corner. After completing the roof and bottom slab, removing all forms and cleaning out the basin, this opening was closed and the backfill put in place. At the present writing, the entire job is complete with the exception of a small amount of grading and cleanup work.

The total quantities of material used are as follows:

Concrete in walls and chambers.....	22,885	Cu. Yds.
Concrete in columns, struts and column footings.....	6,974	"
Concrete in roofs and beams.....	7,826	"
Concrete in floor.....	9,824	"
Class B concrete.....	957	"
Total.....	48,466	Cu. Yds.
Excavation.....	209,000	"
Reinforcing steel.....	5,490,000	Pounds
Steel sheet piling.....	45,950	Sq. Ft.

Prices received by the contractor for the main items are as follows:

Excavation.....	\$ .45	Per Cu. Yd.
Steel sheet piling driving only.....	.40	" Sq. Ft.
Concrete in walls and chambers.....	15.00	" Cu. Yd.
Concrete in columns, struts and column footings.....	16.00	" "
Concrete in roof and beams.....	17.00	" "
Concrete in floor.....	9.00	" "
Class B concrete.....	12.00	" "
Reinforcing steel.....	.04	" Pound

The total amount of the contract will aggregate about \$1,200,000.00.

The work has been handled under the general direction of John C. Pritchard, Director of Public Utilities, and under the direct supervision of Leonard A. Day, Water Commissioner. E. E. Easterday is Division Engineer in Charge of Design, and George W. Reichert has been Resident Engineer from start to completion. The Frazier-Davis Construction Co. of St. Louis has executed the work.

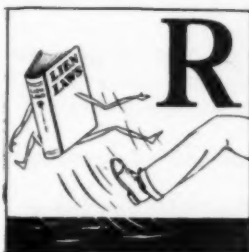


A Good Caterpillar Helping a Tree to Get Along in Life. A Scene in the University Park Addition to Dallas, Texas

# Improper Highway Bonding Practices

By A. R. Hirst

Chief Engineer, American Vibrolithic Corporation



RURAL highway construction has wrecked more contractors than preferred blondes have wrecked homes. It appears to be the almost unanimous opinion that in the last decade, the total money lost on rural highway contracts far exceeds the total money made. The Surety Bonding Companies have felt this unfavorable situation as keenly as any others, and it has been their lot to shoulder all the complaints. The almost universal answer of bonding men to the accusation that they are bonding bidders who are too low is, "We often do, but

we never deliberately bond a contractor unless he can show sufficient assets to finish the work even if he does not make a profit." They claim that when the contractor is, in fact, solvent, although he may have bid unwisely, and may have obligated himself to a probable loss, it is their business and their duty to furnish him a bond. Further, they state that if their company did not, some other company would, and that if all present companies did not, new companies would be formed which would.

A corrective plan which is open to the gravest objections is that which permits only those contractors to bid who are judged in advance to be competent. If honestly and fairly administered at the outset, it is apt to be prostituted before it goes far, due to political pressure, likes and dislikes, or bribery. If really enforced, it probably unwisely and unfairly restricts competition and restrains the legitimate expansion of growing contractors.

A central rating bureau to be created and maintained by the bonding companies has been proposed. The plan suggested is that all contractors would justify their right to be bonded by continuously filing with this bureau full certified information as to their finances, equipment, etc. This plan is autocratic, would be extraordinarily costly, and probably entirely worthless. Reports filed today may be worthless tomorrow. Another proposal is that the municipalities, instead of requiring or preferring surety bonds, should permit contractors to deposit with them high class bonds in lieu of surety bonds. The handling of these bonds by State and County Highway Departments, without surety bond to the contractor for their safe delivery upon the completion of the contract, would involve serious

## The Questionnaire

*While many plans for improving contracting conditions have been suggested, the most talked about plan has been that of requiring all contractors bidding to file a full statement of experience, equipment, and resources with their bids. We have no faith in the efficiency of questionnaires in reducing incompetency. The best contractors are often the poorest statement makers and the least convincing liars. Efficiency is not marked by financial assets or machinery. It is a heritage of experience, honesty and manhood. These can be judged only from the personal knowledge of the awarding body and its agents, or by inquiring from other bodies who have dealt with the contractor.*

## THE CHIEF PARTICIPANTS

There are involved in the program of highway building at least the following participants: 1. The Public, 2. The Governors and Legislatures, 3. Newspapers, 4. Highway Officials, including their Engineers, 5. Contractors, 6. Bonding Companies, 7. Banks, 8. Manufacturers and Dealers in Highway Materials, Machinery and Supplies. In the background, and more or less influencing every one of these factors is the great American game of Politics, which

always bears directly or indirectly on all work for which the public pays.

Following are cited some of the sins of all these factors. Generalities and indictments en masse are always dangerous, but we believe that the allegations made are close enough to the truth to bear inspection. Many in each class do not come under the condemnation but, broadly, many in the class do the things cited:

1. *The Public* is not very guilty, because it does not and cannot know what it is all about. Its only part in the game is to be

the largely newspaper created "force of Public Opinion." Like the chorus in the opera, the Public howls when the conductor (the newspapers) directs it to howl,—which is often—and applauds when given the cue to applaud,—which is seldom.

2. *The Governors and Legislatures*, past and present, are guilty because they create and maintain the laws under which public work is done. Their largest contributions of evil are the damnable lien laws which in many states make the bond responsible for payment of all the material, machinery and supply bills of contractors. In our opinion, more impossible contractors get contracts due to these all embracing lien laws than to any other single reason. Why should material, machinery men or merchants worry about poor and unsound contractors when the States, Counties and Bonding Companies act as 100 per cent perfect collectors for them?

3. *The Newspapers* are particeps criminis because they almost invariably play politics or policy as against right or sound business, when public matters are concerned. They would not permit radical reforms in



letting practices because they would instantly scent a scandal, and make life miserable for the public officials who endeavored to break new ground in their awards. The press prefers one scandal, or even a suspicion of a scandal, to one hundred efficient public performances, and will print a thousand times more about the former than the latter.

4. *Public Officials* and their engineers are naturally large factors in the situation. They are much more blamed for low priced contracts than they deserve to be. Most of them would greatly prefer to give competent contractors fair prices rather than to prosecute much of their work with incompetents who bid cost or less. But these officials are creatures of the public and of politics. They are closely watched by the politicians of the other side, and by the newspapers, especially those of the opposition. Any State or County Highway Department which did its shopping entirely on Fifth Avenue, repeatedly throwing out low bidders, would be changed as soon as the politicians of the other side, the newspapers and the public became aware of it.

5. *The Contractors* are guilty

(a) Of being highway contractors when good judgment would indicate some better appreciated form of philanthropy.

(b) Of "Jazz bidding." We once suggested an ouija board as a proper instrument for computing bids. We are too conservative. Many contractors are now using for their total bid the license number of the first car they see.

(c) Of getting bonds, money, machinery, materials and supplies from institutions and firms who are guilty of persistently doing business with and encouraging bids by absurdly low and incompetent contractors.

6. *The Bonding Companies* are guilty

(a) Of bonding any one who can show that he or he and his friends and relatives combined can pay the probable losses.

(b) Of furnishing bid bonds or certified checks to all and sundry, provided the all and sundry can stand the probable losses.

(c) Of introducing new competition into fields already crowded.

(d) Of paying little or no attention to slipping contractors until the work is hopelessly involved and delayed. This increases the losses and will later raise the rates. It also produces grave public losses in lack of use of highway structures too long out of service.

(e) Of bonding the worst risk at the lowest price. The companies are not wholly responsible for this, but they could, with contractors and others interested, work out a solution if they really were interested and applied their talents to the problem.

7. *The Banks* are guilty

(a) Of often issuing certified checks to contractors who have not the funds.

(b) Of encouraging new firms and undue expansion of small firms when no expansion is necessary or advisable.

(c) Of granting unjustified credits on work, the only excuse for which is that the borrower has other assets which the bank can realize upon.

8. *The Material and Machinery Manufacturers and Supply Companies* are guilty

(a) Of being largely instrumental in having placed on and kept on the statute books those lien laws which best protect them and best promote irresponsible bidding and contractors.

(b) Of selling goods to any one under the protection of these all inclusive lien laws.

(c) Of introducing into crowded fields new competition which will use their especial goods.

#### THE ANSWER

Then what is the answer? There may be none. Something may possibly be done to ameliorate the situation. We would suggest:

1. Concerted action by all concerned to eliminate all lien laws protecting sellers of machinery, materials and supplies.

2. Concerted action by all concerned to secure the inclusion in all specifications of provisions for severe penalties for delays and equally large bonuses for extra speed, and to insure their rigid enforcement.

3. Concerted action by all contractors in the various Contractors' Organizations to select certain bonding companies and

give them all their business provided those bonding companies (1) would not bond incompetents; (2) would show their books annually; and (3) would share the profits. If none of the present bonding companies would consent to do these things we would advise the organization of one which will.

4. Concerted action by all concerned to eliminate bid bonds and certified checks not backed by the bidders' own cash.

5. The boycotting by good contractors of all other factors in the game who are unduly encouraging unfair competition by the ignorant and incompetent.

These are big orders, but the game is a big game. Nothing can be done unless the contractors really get at it and hire men with brains and energy to work on the problem 365 days in every year. To effect any improvement will take brains, money, energy and time.

ACKNOWLEDGMENT.—From a paper delivered before the Contractors Section of the American Road Congress at Cleveland, Ohio, on January 11, 1928.

#### A Correction

On page 86 of the February issue of CONTRACTORS AND ENGINEERS MONTHLY, in the article "Portland's High Speed Boulevard," we erroneously stated that the iron mules used were Bates iron mules. These iron mules are a product of The Hughes-Keenan Co. of Mansfield, Ohio.

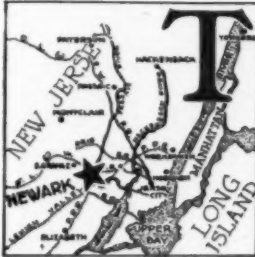
### Bonding Rates

*A gem of governmental thought is the almost universal application of the uniform rate laws. Under these beneficent (supposed-to-be anti-discrimination and pro-competition) provisions of statute, the happy result is attained that the lower the bid (therefore, the greater the risk to the Bond) the lower the premium. If some philanthropist takes a job at one-half the fair price, some benevolent bonding company will bond him for one-half the amount it would charge a competent contractor with the fair price.*

# A Foundation Job in Newark, N. J.

By Max H. Foley

Resident Engineer, Voorhees, Gmelin & Walker, New York City



THE site of the New Jersey Bell Telephone Building in Newark, New Jersey, is a plot bounded on the east, south and west by Atlantic, Lombardy and Broad Streets, and on the north by the Cadillac Building. The building is to be a twenty-two story structure with two basements and is to house the administrative, engineering, plant and accounting departments of the recently formed New Jersey Bell Telephone Co.

Demolition of the existing apartment, residence and store buildings was started on May 6th, 1927. Previous to that date, core borings were made at six different locations in the lot and two test pits were dug. The borings showed sand, gravel and boulders with a small amount of clay to an average depth of 40 feet below street level, then a hard pan mixture of sand, clay and boulders down to rock. The rock was encountered at an average depth of 55 feet below street level. Ten- and fifteen-foot cores of the rock were taken and showed red sandstone in layers about 12 inches in thickness. The average water level was found to be 35 feet below street level.

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## TYPE OF FOOTINGS

A study was made to determine whether to use spread footings on the hard pan or to go down 15 feet further to rock. The possibility of future excavation for an adjacent building or for a subway under Broad Street, the difference in elevation of the hard pan at different locations in the lot, a distrust of its permanent bearing value, and the value of two basements instead of one were all factors in the decision to go to rock. Twenty-eight tons per square foot was taken as the maximum bearing value of the rock. Subsequent developments showed the wisdom of the architects' decision not to support the building on the hard pan. While it was a hard tough mixture to drive through and excavate, it softened readily in contact with the water which fol-

lowed the pier sheeting down from the sand layer above, and some layers of treacherous flowing sand and clay were discovered in it. In many of the pier holes it was necessary to remove from 1 to 6 feet of soft rock before rock of the proper bearing value was reached.

## UNDERPINNING

While demolition was still in progress at the south end of the lot, the underpinning of the Cadillac Build-

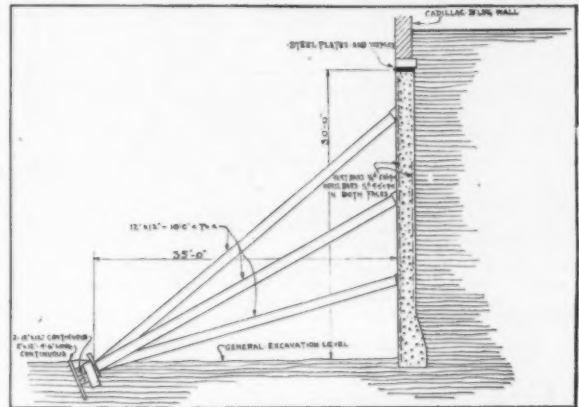


Figure 1. Section Through Underpinning Wall

ing was started on the north. This building is three stories high with a basement under the west half only. It is of steel and fireproof construction with wall bearing beams. The footings for walls and columns rest on sand about 4 feet below street level in the east half and 13 feet below in the west half.

The underpinning operation was started by excavating for sections 5 feet wide at ten points under the 235-foot wall footing. The banks of these pits were shored with wood frames of 3 x 12 inches set one below the other as the digging went on. Boulders were encountered in large quantities and care had to be taken to backfill through the 2-inch spaces left between frames for the purpose, in order to prevent serious loss of sand

under the building. When the first ten holes had been carried down to the same elevation to which the new basement wall footings were to go, reinforced sections of underpinning wall were poured in them, steel plates were set at the top, and steel wedges driven. Then ten more sections were started. This operation was repeated until the entire underpinning wall had been poured in short sections. Figure 1 shows the reinforcing of the underpinning and the method of shoring this wall as

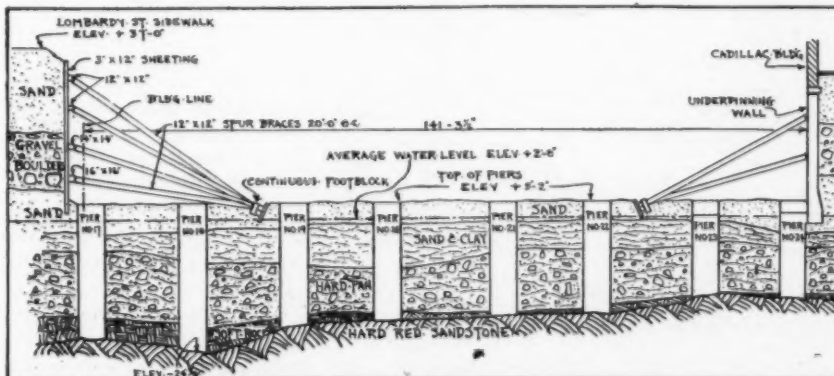


Figure 2. Cross Section Through Lot Showing Soil and Rock Conditions and Shoring of Banks

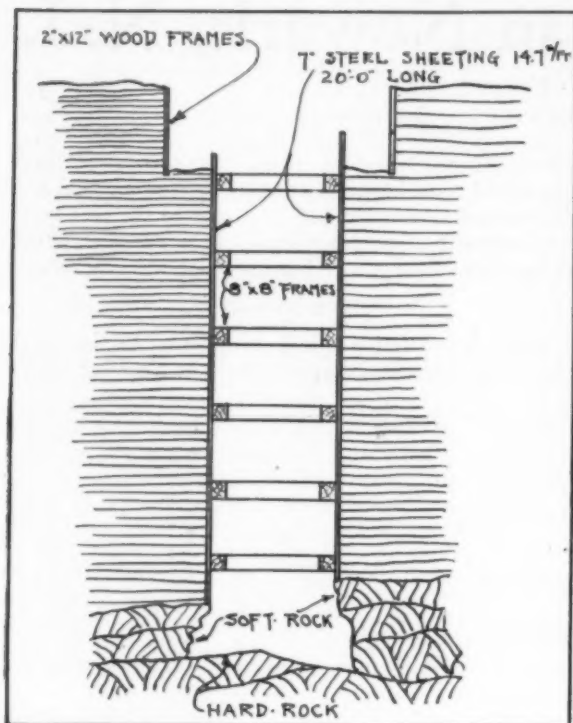


Figure 3. Section Through Steel Sheeted Pier Hole

the general excavation was done.

#### EXCAVATION

General excavation was done with steam shovels which were afterward converted into mobile steam cranes and used to support the steam hammers and supply steam for driving sheeting. A cost study quickly showed that it was cheaper to use these cranes than to use stationary derricks. The street banks on three sides and the Cadillac Building wall on the fourth were shored as shown in Figures 1 and 2. The footblocks were designed to exert a pressure of 4 tons per square foot on the unexcavated bottom. As expected, the ground behind the footblocks gave slightly before getting its "set" and the wedges were driven up each day

until there was no more movement. Fifty-ton screw jacks were used at some points along the Cadillac Building.

The open caisson method was used for excavating in the eighty-five pier holes. Seven-inch steel sheeting, 14.7 pounds per foot, in 20-foot lengths, was used for the piers along the building and lot lines and for those immediately behind the footblocks which held the bank shores. Steel was deemed advisable for these piers in order to insure against loss of ground. For the interior pier holes, wood sheeting, 2 x 12 inches, was used in

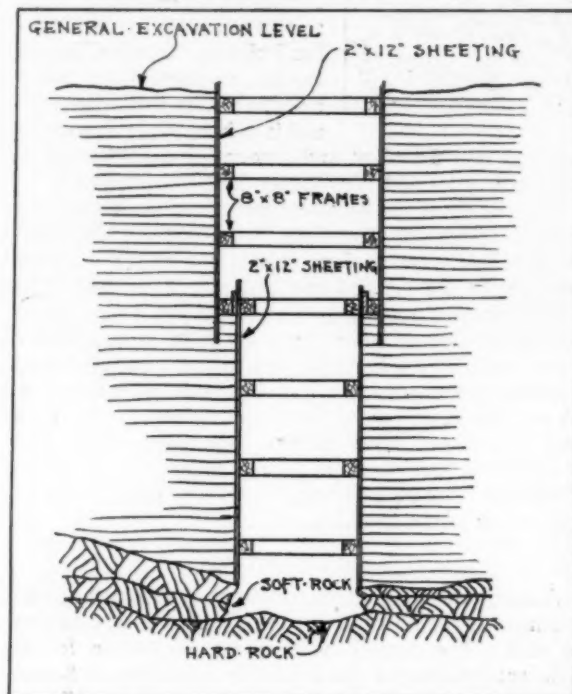


Figure 4. Section Through Wood Sheeted Pier Hole

two lifts, because of the saving over steel. The first lift was driven about 3 feet below the top of the hard pan and the second lift from that level down to rock. Figure 3 shows a cross-section through a steel-sheeted pier hole and Figure 4 through one which was wood-sheeted.

While steam was used in driving steel sheeting, compressed air hammers were used for the wood. It was possible to drive the steel about 2 feet into the hard pan each time before mucking out but it was necessary to mine continually below the edge of the wood sheeting before driving. The water in pier holes was kept down by pulsometer pumps pumping into three holes which were used as sumps. The sand and clay settled out of the water in these sump holes and it was then pumped into the sewers by centrifugal pumps. In

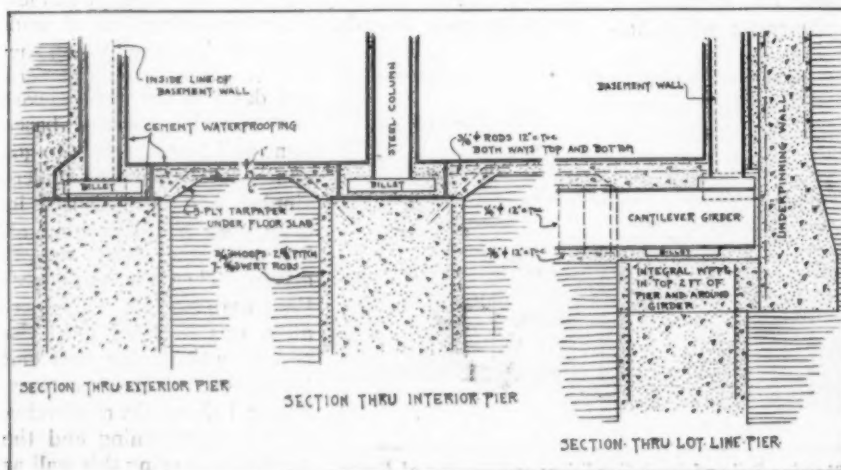
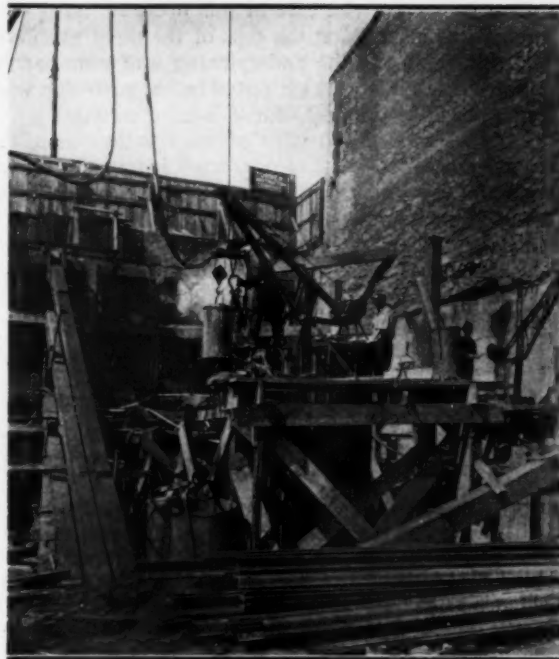


Figure 5. Typical Details of Pier and Basement Floor Construction





*Bottom of a Wood Sheeted Pier Hole Showing Two Lifts of Sheetting. The Men Are Standing on Rock. A Pulsometer Pump Is Shown in One Corner.*



*Steel Sheetting Being Driven by Steam Hammer. Mucking Is Shown Being Carried on With Small Buckets Raised by Hand Derricks.*

working twenty piers at a time, approximately 600 gallons per minute had to be pumped.

Figure 5 shows sections through a typical interior pier, a lot line pier, and a pier adjacent to the Cadillac

Building. At rock, the unit compressive stress in the concrete piers was figured at only 400 pounds per square inch but economical design of the column billets made the pressure directly under them 1,000 pounds per



*General View of the Northwest Corner of the Lot Showing Cranes at Work and a Steel Sheeted Pier Hole in the Foreground.*

square inch. To take care of this pressure, hoop reinforcing was installed at the tops of the piers as shown. The columns along the underpinning wall were carried on cantilever girders which rested on the piers and were framed back to the next line of interior columns.

In order to save a month of construction time, the basement steel columns were erected before the retaining walls were poured. These walls are reinforced to take the bank pressure. This pressure on the walls is taken up at the sub-basement and basement floors which are of reinforced stone concrete and at the first floor tier of steel. A sump pit and elevator pits are located below the level of the sub-basement floor.

#### WATERPROOFING

Cement waterproofing, one inch thick, was applied

over the entire sub-basement floor and 17 feet up the inside of the retaining walls. In addition, the waterproofing was carried under and around billets and grilages and 5 feet above the sub-basement floor on all interior columns. This waterproofing, which consisted of rich cement mortar to which a waterproofing paste was added, was troweled hard on the concrete surfaces which had been prepared by hand chipping. Two coats were used on vertical and one on horizontal surfaces.

The architects for this building are Voorhees, Gmelin & Walker. The consulting engineers for the foundation are Moran, Maurice & Proctor. The Turner Construction Co. is the general contractor and the sub-contractor for the foundations is the Arthur A. Johnson Corporation.

## Weather Bureau Records and Winter Construction

**T**HE weather is always a subject of conversation especially in the construction industry. Whatever the state of the weather at a given moment it is generally considered "unseasonable" or "unusual" whether in New York, California or Florida. It is called fickle and capricious. Such characterization gives a sort of elusiveness to it—an uncertainty that, however romantic it may be, is hardly in accordance with the facts. At the risk of taking a certain amount of charm out of the weather, it is worth while to apply the scientific method to the cold statistics and to examine the records. Examination of the meteorological records for New York City shows that precipitation is greatest in July and August which is not considered a deterrent to building programs.

All data given were recorded at the New York station, 17 Battery Place, but they may be taken as a fair estimate for the metropolitan district.

Temperature is a more serious matter. The record shows that while freezing weather may occur during six months of the year, only January and February have mean temperatures below freezing of 30.9 and 31.3 respectively.

#### WINTER TEMPERATURES

Dec.	Mean	Max.	Min.	Precipitation
1923	42	64	24	3.78
1924	34	61	11	2.38
1925	34	57	7	3.33
1926	29	50	7	3.72
1927	37	67	15	3.39
	35.0 Since 1871			
Jan.	Mean	Max.	Min.	Precipitation
1923	31	53	10	5.97
1924	32	57	8	3.56
1925	29	46	-1	5.30
1926	32	54	4	2.52
1927	30	51	-1	1.95
1928	34	55	11	1.41
	30.9 Since 1871			
Feb.	Mean	Max.	Min.	Precipitation
1923	27	46	7	2.33
1924	29	46	9	3.84
1925	38	63	12	1.92
1926	29	50	8	5.46
1927	37	56	22	3.33
	31.3 Since 1871			
March	Mean	Max.	Min.	Precipitation
1923	37	73	10	4.08
1924	39	63	23	1.65
1925	44	68	10	3.25
1926	35	66	13	2.52
1927	43	72	17	1.18
	37.7 Since 1871			

Recognizing that cold is the chief factor to be eliminated in winter work, the engineer has developed the means to overcome it. In spite of his continuous success, however, building in winter is still looked upon with disfavor by a few owners and it is to remove this ancient prejudice that the industry must not only make use of the facts concerning weather, but must also point out the operations that are being conducted without interruption from rain, snow, sleet or cold.

#### WINTER CONSTRUCTION IN NEW YORK

The New York Building Congress, 101 Park Avenue, New York, through its Committee on Seasonal Operations, advocates winter construction. On the following page are shown progress pictures of several construction jobs which have been going on this winter in greater New York.

A glance at the figures of the Weather Bureau showing the temperature variations and precipitations for the last five years in New York will show the short duration of winter in this district and the comparatively moderate precipitation.

The experience and opinions of many builders in this district are summarized as follows:

"It has been proved successfully that there is no problem in winter protection, but there are times when the weather makes it unwise or uncomfortable to proceed with the work in the open."

"The expedients used in winter construction consist generally in approved anti-freeze preparation mortar for brickwork in the concrete. The sand is heated for the concrete. Some contractors use a blow torch on the concrete mixer, being careful to see that the completed work is properly covered up until it has had a chance to set. Care should be exercised in removing the centers for the concrete arches and this sometimes necessitates allowing a longer period of time for these arches to set and the use of somewhat more lumber for centering than would be the case in the summer months."

#### PROTECTION TO WORKMEN

"Men working on the scaffolds are protected with tarpaulins, and it has been found wise to install flood lights that can be used during the darker portions of the day in order that the craftsmen may not be handicapped trying to do good work with imperfect visibility."

"Masonry scaffolding should be followed up with glazed sash and temporary doors installed on all openings so that the inside of the building is kept comparatively comfortable. The boilers should be set up early in the game and as soon as the building has been substantially enclosed, the heat turned on in the temporary radiators."

"No owner need hesitate to proceed with winter construction if he has selected a competent architect and a competent builder. Many contractors do as great an amount of work in winter in the Metropolitan district as at any other time of the year. Residential work this winter has shown a falling off, many owners hesitating to start their work during the cold season, thus failing to profit by the successful experience of the industry."

"Winter holds no fears for the building industry, nor should it for prospective owners and the public."

ACKNOWLEDGMENT: Reprinted with permission from the February issue of Building Congress News.

# Winter Building Construction in New York City

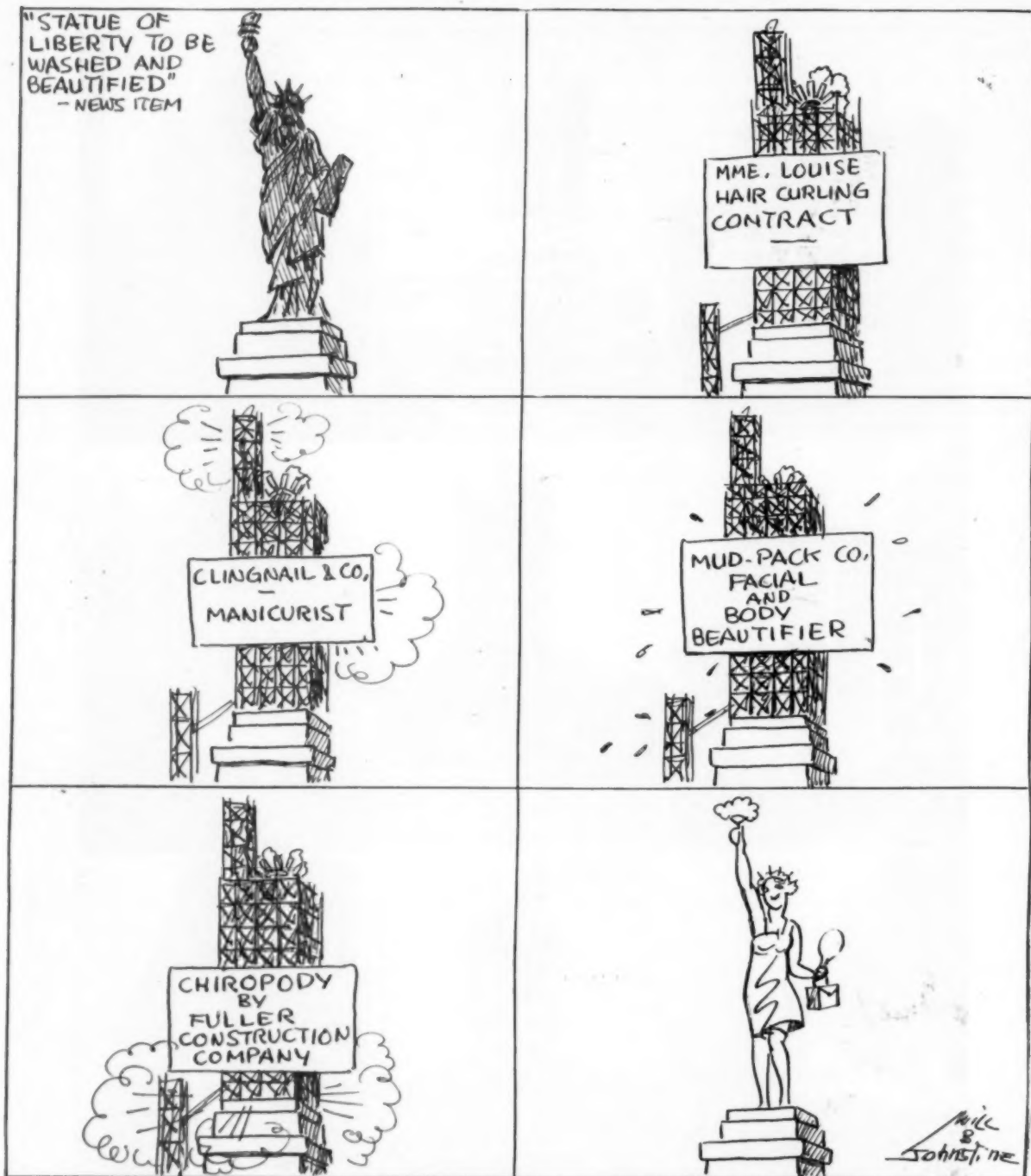


## SEE HOW THESE BUILDINGS GREW DURING THE LAST WINTER

1. Job at 202-206 East 44th Street on December 8, 1927. 2. Same operation on January 1, 1928. 3. Same as 1 and 2 on February 2, 1928. 4. Tower construction at 120th Street, Broadway and Claremont Avenue on November 1, 1927. 5. Same job on December 3, 1927. 6. Same as 4 and 5 on January 1, 1928. 7. Construction at 45th Street and Vanderbilt Avenue on January 24, 1928. 8. Building at 62nd Street and Columbus Avenue on February 3, 1928. 9. Skyscraper at Cedar, Nassau and Pine Streets on February 6, 1928. Illustrations courtesy of New York Building Congress.



## Our Brother Contractors



This Cartoon by Will B. Johnstone Is Published Through the Courtesy of The New York World, Which Published It Under the Title "Liberty—1928"

### Construction Job Management

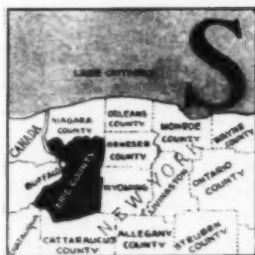
THE first edition of "Construction Job Management," by Charles F. Dingman, has just been published by the McGraw-Hill Book Co., Inc., New York. The object of the book is to place before the builder, or the man who intends to become a builder, a knowledge of the most effective means to be employed in handling the several branches of building construction, and of coordinating the work of the men in

the different trades employed. The treatment is as elementary as possible, since the work is intended more especially for the younger men in the industry. It is based on experiences of general contractors, building superintendents and other members of the construction industry. It is a handbook of 220 pages, convenient in size, bound in soft leather, and sells for \$2.50.

# Road Work in Erie County, N. Y.

By George C. Diehl

County Engineer, Erie County, N. Y.



SINCE and including the summer of 1924, there has been carried on in Western New York an aggressive road-building program planned to meet the constantly growing demand for hard-surfaced roadways for motor traffic. Much of the earlier work was experimental, and even those roads which stood up were inadequate to meet the situation which developed so quickly. There has been little variation, from season to season, in the total amount of construction, which has been just about equal to available funds and the capacity of the various departments engaged in the work to get it done.

During the construction season of 1927, in fifteen Western New York counties, including state and county highways, town roads, city and village streets, a total of 3,000,000 square yards of concrete pavement has been laid. For the same period, in the same area, the total of other materials of the permanent type, is 3,700,000 square yards.

The program for 1928 provides for substantially the same amount of construction. Aside from the building of state highways, the bulk of the work is in the environs of the big cities, Buffalo and Rochester in particular. Erie County, of which Buffalo is the center, is carrying out an extensive road-building program under the direction of the Erie County Highway Department. It contemplates a greater motorways system including twenty-two radial roads extending from the city to the county line on the north, east and south. Lake Erie is the city's western boundary and all west traffic must leave or enter via the south boundary.

Supplementing these radials, eighteen of which are in existence, there are two belt lines, parallel with the city's rectangular boundary on the three sides, located at approximately  $2\frac{1}{2}$  and 5 miles from the city line. A width of forty feet has been adopted as the standard of paved surface for all of these highways. Wherever possible, wider rights-of-way are being secured so that the paved width can be increased, in the future, without the excessive cost which results if greater widths are needed after development.

## TYPICAL JOBS

Work on the inner of the two loops will illustrate the method followed in Erie County. Its northerly section is made up of Sheridan Drive, in the town of Tonawanda, on a 200-foot right-of-way. Between Military Road and Colvin Boulevard it has two 30-foot concrete roadways, with a parked area between. For the rest of the route east and west it has a 40-foot pavement.

Union Road, with extensions and connecting links, forms the easterly section of this loop. The north end is under contract and will be completed early in 1928. The section south of Clinton Street was finished and

opened to traffic in the summer of 1927, with a temporary foundation course pavement.

Lake Avenue, the southern section, is paved with concrete from the Lake Shore Road on the west to South Park Avenue. An extension through the Morgan Road, widened, to the south end of the Union Road, was completed and opened in October. This extension, also, is a foundation road, later to have a concrete surface.

Two million dollars have been budgeted by the Erie County Board of Supervisors to expedite the construction of this greater motorways system during 1928, the projects provided for including three of the additional radial roads. Similar provisions are being made by other Western New York counties, in proportion to their resources, to carry on the work of providing modern highways.

This brief statement indicates the solid foundation upon which a practically new industry has been created, centering in Buffalo and its environs, for supplying and handling the vast quantities of materials required. It includes extensive new plants for the manufacture of cement, the modernizing of quarries to supply crushed stone in the required sizes, and the installation of washing plants for sand and gravel, all indicated by the



Checking the Subgrade Elevation Before Final Rolling

increasing use of concrete, both for road building and other construction. Road-building contractors, too, have been obliged to replace inadequate equipment with more efficient tools, or be crowded out of the field.

## WORK ON WEHRLE DRIVE

A typical construction job during the past season, an outstanding performance in concrete pavement work, was consummated by the Meyer & Meyer Corporation of Depew, N. Y., a Buffalo suburb, on Wehrle Drive, extending easterly from Kensington and Harlem Avenues to the Transit Road, on the Saratoga Road, and adjacent sub-divisions.

During the season, this corporation constructed approximately 350,000 square yards of 8-inch 2-course

concrete pavement. This is roughly equivalent to 33 miles of 20-foot concrete roadway. The pavement, laid in two courses, consisted of a 6-inch base course of 1:2:4 mix and a top course of 1:1½:2 mix. These courses were laid simultaneously, one with the other, so that there was no question of the bonding together of the courses.

#### CENTRAL PROPORTIONING PLANT

The greater portion of this yardage was constructed from a central batching plant located in the quarry of the Buffalo Crushed Stone Co., in North Buffalo. This plant has a daily capacity of 2500 tons. It has two Allis-Chalmers crushers, Nos. 12 and 7½, and two No. 6 Austin crushers. The crushed stone is elevated to screens, sized and distributed to the various bins. Aggregators deliver the required measured quantities of stone into batch boxes or apartment trucks, which are then taken into the yard for the cement and sand,

#### HAULING TO MIXER

Batches were handled on 1-batch pneumatic-tired trucks capable of a 40-mile-per-hour speed. The average haul to the mixer was 2½ miles. Three Koehring mixers, of the 27E type, were in operation, with a fourth in reserve. Trucks were so regulated that the mixers did not have to move after placing the bottom course until they had placed the top course. Water was obtained through pipe lines connected to municipal water mains.

After the mixer had discharged its batch, the concrete was shovel-spread, tamped, and leveled off 2 inches below the forms by means of a heavy screed. The reinforcement was then placed, after which the top was dumped. The top was then leveled off, screeded, and belted. A two per cent admixture of calcium chloride was used in both mixes. Burlap covering was placed over the finished pavement for a 12-hour period and the road closed for ten days.



CONCRETE ROAD CONSTRUCTION METHODS IN ERIE COUNTY, NEW YORK

1. Leveling the bottom course. 2. Leveling the top course. 3. Screeding the top course. 4. Hand belting the top course.

which are dropped on the rock, ready for the mixer on the job.

The crushed stone for coarse aggregate was obtained from the batch meters, fed directly from the crusher bins of the stone company. The fine aggregate, as well as the coarse aggregate of pea gravel for the top course, was shipped in by rail from the washing plant of the J. E. Carroll Sand Co. at Franklinville, N. Y.

Fine aggregate and pea gravel were unloaded by means of Osgood and Northwest gasoline cranes on to the stock piles and from there into Blaw-Knox bins, equipped with batch meters. Cement was dumped from the bags into 2-wheeled buggies, each buggy carrying the six or eight bags of cement as required. A sunken driveway allowed the use of platforms on to which these buggies were wheeled and then dumped into the batch boxes.

#### FOUNDATION ROADS

Foundation roads, referred to above, consist of 6 to 12 inches of broken stone, or slag, spread, rolled and filled in the same manner as a foundation or bottom course for bituminous macadam pavement, with shoulders and ditches provided. Standard, 10-ton, 3-wheel rollers are used.

The foundation course is so constructed that traffic can use it for a short period, one or more seasons, without damage, depending on the type and amount of traffic it serves. As soon as it is determined that the traffic is becoming too heavy for the foundation course, as laid, the final concrete is put on it. On those portions of foundation course roads built on new rights-of-way or old rights-of-way which have lost their stability because of new grades, or new locations, the life of these



"THEY ARE  
**EXCELLENT**  
LOCOMOTIVES"



WOODS BROS. CONSTRUCTION CO.  
ENGINEERS AND CONTRACTORS  
LINCOLN, NEBRASKA  
Dec. 2, 1927

The Fale-Root-Heath Co.  
Plymouth, Ohio  
Gentlemen:

Our first experience with Plymouth gasoline locomotives was in building fourteen miles of concrete seawall on the Gulf Coast, where three 8-ton Plymouth units were used for a period of seven months. These locomotives were operated continuously under most severe conditions, at an astonishingly low figure for maintenance, and at the finish of the job were in excellent condition.

They were then transferred to our Starved Rock, Illinois job, where we are placing a total of 100,000 yards of concrete, all to be handled from a central mixing plant in 3 yard cars. In order to complete our daily schedule, it was necessary that more power be provided, so three duplicate 8-ton units were purchased, making six Plymouths in all handling this job, and carrying out our program continuously without any delays.

We have absolute confidence in the ability of Plymouth locomotives to handle our hauling problems in a most satisfactory manner.

Very truly yours,  
WOODS BROS. CONSTRUCTION CO.

*Haynes Ringle*  
Chief Engineer



WOODS Brothers Construction Company,  
Lincoln, Nebraska, now building the  
Starved Rock Lock and Dam for the  
canalization of the Illinois River be-  
tween Joliet, and Utica, Illinois, made this state-  
ment of their Plymouths while working them all,  
twenty hours per day.

Three eight-ton Plymouths hauled 900 yards of  
concrete per day. The haul is 1200 feet and they  
use 3 trains of 3 cars each. An interesting feature  
here also is the moving of the 130 ton steel lock  
wall forms with the Plymouths. These forms  
run on rails and are moved 60 feet each time—  
this is accomplished in 30 minutes.

"We are showing them plenty of hard work, and  
they have never failed to respond," says Mr.  
George K. Leonard, General Superintendent of  
this important piece of construction.

From where the jobs are the hardest, comes the  
strongest praise of Plymouth performance.

PLYMOUTH LOCOMOTIVE WORKS  
The Fale-Root-Heath Company  
PLYMOUTH, OHIO.

**PLYMOUTH**

GASOLINE *Locomotives* DIESEL

If It's a Track Haulage Problem  
There's a PLYMOUTH to Solve It

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

foundation course roads is less than when placed on old existing highways.

It is found that the cost of constructing such foundation courses is practically all saved in the construction of the final concrete because of easier construction of the final course and savings in the quantities of materials.

#### HIGHWAY BRIDGE POLICY

During the past year, also, there has been established in this territory a new policy in highway bridge construction. Some new work has been finished and a large amount is under construction. The change was made possible by enactment of the State Legislature in 1925 providing that the State and any of its counties may share, on the basis of 65 and 35 per cent respectively, in the cost of such structures.

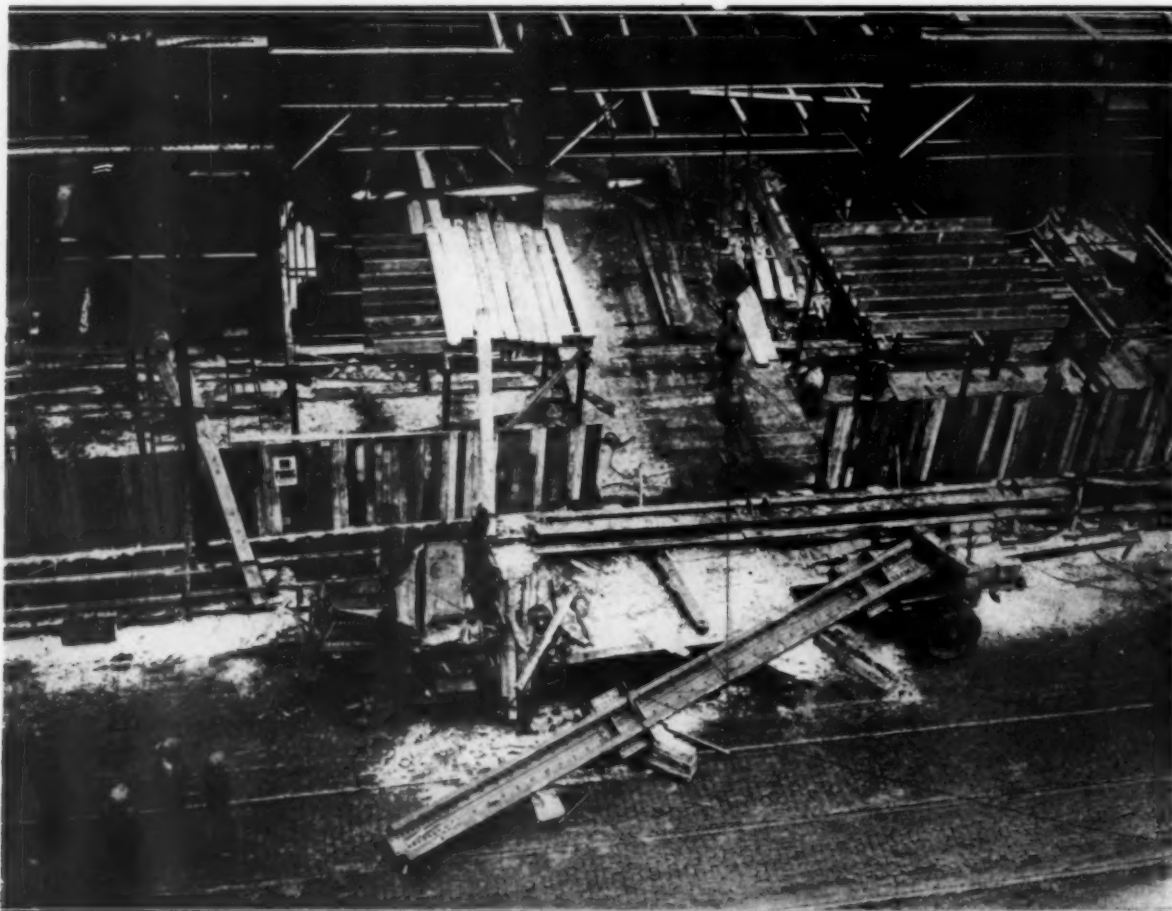
While this law became effective on January 1, 1926, some time was required for the necessary surveys and the adoption of a State program whereby the bridges for which the greatest need existed should be the first to be built. Before this enactment, in this state, bridges were wholly a town charge except that the State High-

way Department did provide bridges on the principal state highways.

The replacement now under way not only removes structures of doubtful safety but replaces them with bridges having driveways as wide as the roads approaching them, and paved with the same material. Steel and concrete both are used, according to circumstances. A few towns in this county already had provided adequate bridge structures on their principal routes but throughout the state the more rural communities found it impossible to raise enough money for any adequate program of improvement, with the result that many good roads were limited in capacity by narrow and unsafe bridges.

#### HIGHWAY WORK JUSTIFIES ITS COST

Perhaps the most satisfactory summing up of highway improvement in this vicinity is to say that all such work justifies its cost, and pays for itself, in the increased values which follow closely on the completion of such construction. This is so generally understood and conceded that the governing bodies of the several counties are willing to appropriate funds for such work.



*Photograph Courtesy Newark, N. J., Evening News*

**A LARGE DERRICK DROPS A 14-TON GIRDER IN CONSTRUCTION OF THE L. BAMBERGER & CO., ADDITION AT NEWARK, N. J., ON FEBRUARY 1**

*Three men standing by this crushed truck escaped death or injury by the narrowest of margins*



**DRUM**—57 in. x 42 in. with large radius corners. Feed and discharge openings 22 in. Ample room to handle a three-bag batch of 1-2½-4.

**COUNTERSHAFT**—High carbon steel running in Hyatt roller bearings in self-aligning boxes.

**GEARS**—Cut and running in a bath of oil. Alemite lubrication.

**QUICK FEED**—Power loader takes full load without crowding and goes up in seven seconds. Automatic knockout on power loader. Overhead shaft carried in self-aligning boxes. Mixer self-sustaining with power loader. No braces required.

**CONTROL**—All control levers at drum end. Operator sees both power loader and discharge.

**TRUCKS**—Automotive type, front axle.

**MAIN ROLLERS**—Genuine car wheels with Timken roller bearings running on alloy steel shafts.

**TRACTION RINGS**—One piece forged, high carbon, locomotive steel tires.

**Ransome Concrete Machinery Company**

1850—Service for 78 Years—1928

Dunellen

New Jersey



## Modern Plant for Progressive Contractor

**T**HE new office, machine shop and garage building of Edwin A. Irish, Los Angeles contractor, which was completed last fall, while covering a comparatively small area, is a remarkably well-planned plant. This organization specializes in underground conduit construction and maintains the largest battery of air compressors on the Pacific Coast for pavement breaking and wrecking purposes and for use in connection with the installation of underground conduits for public utilities. Because of the type of work handled by this company and the fact that the compressor fleet is on a 24-hour-a-day basis, a large structure was not as important for efficient operation as a location and a building properly planned in which all working units and the general office could be centralized.

The selection of a site that would meet the requirements of the firm presented a difficult problem. Before determining upon a site a comprehensive study was made of several available locations, the result being that a lot was purchased on Mignonette Street, a short street one block long, running east and west between Fremont and Boylston Streets, two blocks north of First Street. The study involved a close check of all work covering a period of several months to determine where the bulk of the work was being done. An analysis of the survey indicated the main plant should be located west of the central business section. With this point definitely settled the next question was the site that was accessible to all parts of the city with the least interference from traffic.

The Mignonette Street site was selected for its strategic position which is within a few blocks of the central business district, yet so situated that equipment can be readily dispatched to outlying districts or to the heart of the city with the least possible loss of time. A location near the central business district was of paramount importance, due primarily to the fact that the bulk of the compressor work is on downtown streets and



*The Office Building of E. A. Irish, Los Angeles Conduit Contractor*

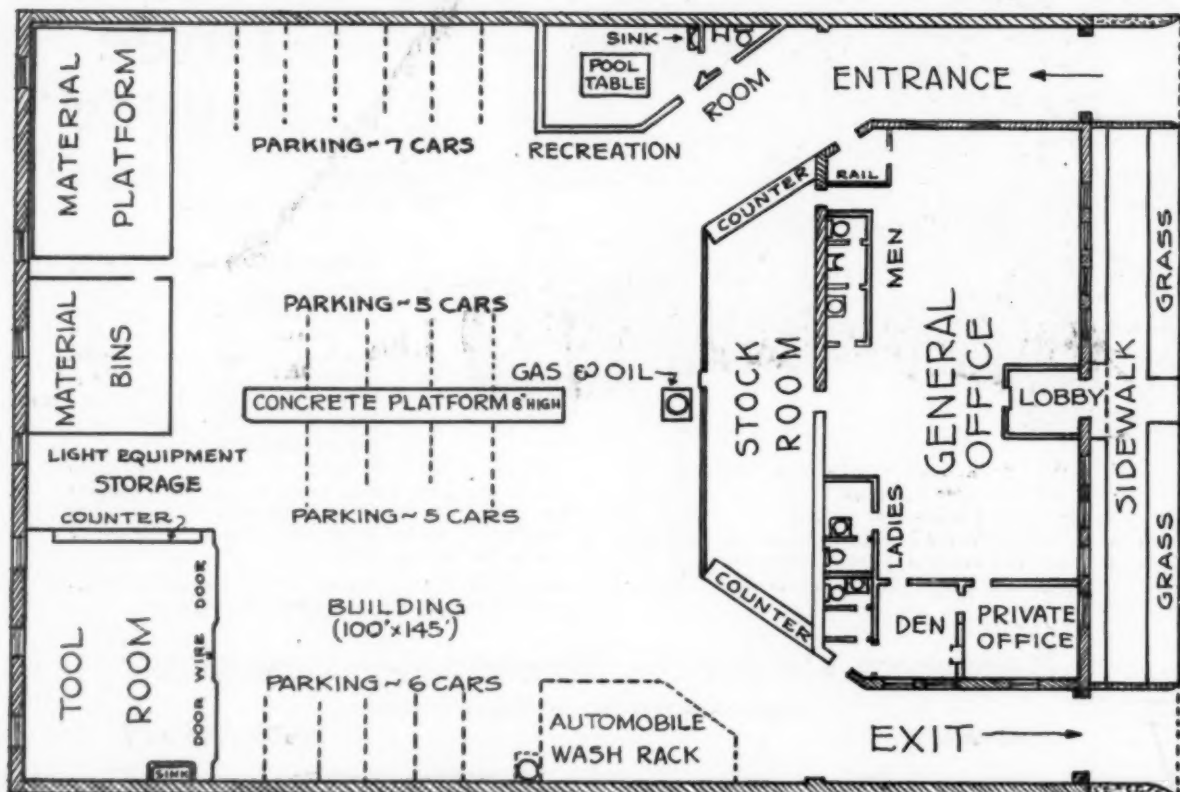
must be carried on during the night, and further complicated because a large part of this class of work is emergency, and rapid transit to the point of operation is most essential.

### THE BUILDING

The new building is a one-story structure of brick construction with a north frontage of 100 feet on Mignonette Street, and contains 14,500 square feet of floor area. The general office is located in the front section of the building and occupies approximately 2,300 square feet of space. Large windows provide ample light and the use of artificial light during the day is not required by the employees. Over the two rest rooms and private office filing cabinets have been built where old records are kept.

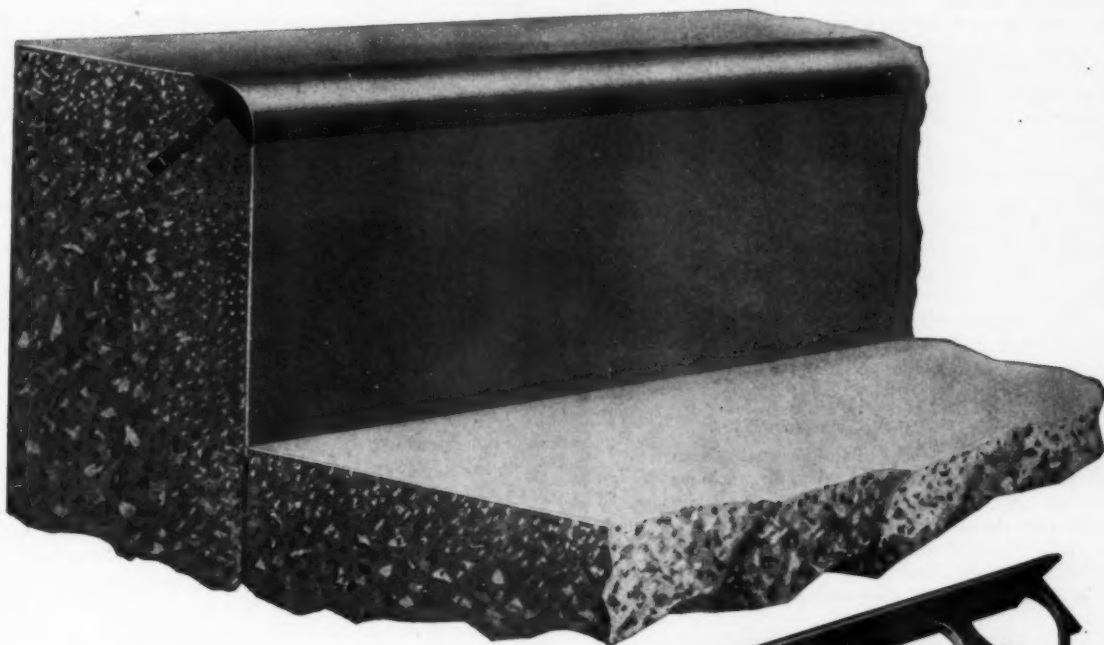
### RECREATION ROOM

One feature of the lay-out which is worthy of consideration



*Layout of the E. A. Irish Office Building and Material Yard*

## Lasting Protection for Concrete Curbs



**TRUSCON**  
**CURB BARS**

### OTHER TRUSCON PRODUCTS for Better Road Construction

WELDED STEEL FABRIC  
for Permanence

DOWEL CONTRACTION JOINTS  
for the elimination of cracks

RIB BARS  
for additional reinforcement

STEEL ROAD FORMS  
for speedier construction

Another maintenance charge eliminated! Truscon Curb Bars give permanent protection to the exposed edges of concrete curbs and prevent cracking and chipping with consequent replacement charges. The plate exposed to wear is wide and thick and the entire bar, including anchors, is formed from a single steel section, insuring a perfect bond with the concrete. Made in 8, 10 and 12 foot lengths which can be furnished bent to radius when required.

**TRUSCON STEEL COMPANY**  
YOUNGSTOWN, OHIO

is the recreation room which has been provided for the employees. This room is situated on the west side of the building and is easily reached from the office or workshop. A pool table is provided for the entertainment of the employees. Writing tables and magazine racks filled with current issues of magazines and easy chairs also add to their comfort. This little attention on the part of the contractor has no doubt paid big returns on the initial investment. Before the new building was completed and this feature added, the contractor at times found it difficult to make up a crew for an emergency job on short notice. Today, however, he has no fear of not securing an experienced crew on a moment's call as experienced mechanics and laborers take advantage of the comfort provided in the recreation room and wait for the call.

#### STORAGE SPACE

In planning the building, Mr. Irish had foremost in mind the efficient handling of the enormous amount of equipment which would be housed in the new building. Storage space is provided for 36 pieces of equipment or trucks. A gasoline pump and lubrication station is located in the center of the building near the store room. Here all working equipment and trucks are filled with gasoline and oil during the night. An up-to-date wash rack is also included. The superintendent's and foreman's cars as well as those of the managers are washed at regular intervals.

#### TOOL ROOM AND MACHINE SHOP

The tool room is a model of neatness and order. Here are found the hundreds of tools of all kinds, including air guns, compressor units and small tools of all descriptions. The machine shop is equipped with every modern convenience. Three shifts of skilled mechanics, each working eight hours, are employed in this department. All equipment is gone over as soon as it comes to the shop and put in readiness for the next job.

#### WORK OF THE IRISH ORGANIZATION

Although it was only a few years ago that consideration was given to any extent to underground conduits for transmission of telephone and service lines in outlying districts, Mr. Irish has installed more than 15,000,000 duct-feet of conduit for public utilities and sub-division operators in Los Angeles County. He is said to be the pioneer contractor of California in this specialized field of contracting. The large volume of work carried on by this concern requires a heavy investment in equipment. An appraised value of the equipment used by Mr. Irish in this specialized field is in excess of \$100,000, which is considerably more than that of any engineering or building contractor doing several times as much business annually.

Mr. Irish is an active member of the Associated General Contractors of America, Southern California Chapter. During the past seven years he has devoted considerable time to Association work and has served the local chapter as a Director several terms and now is acting as Secretary of the Los Angeles group.

### Not a Snow Scene



*But a Large Camp in the West Texas Oil Fields Where Caterpillar Tractors Are Being Used by an Electric Company in Putting up High Tension Lines Through This Barren Waste of Sugar Sand. Photograph Furnished by R. B. George Machinery Co., Dallas, Texas*

## Stabilization of Industry and Employment by Prosperity Reserves

**S**TABILIZING business and employment by long range planning of public works, and creating a prosperity reserve, has long been the aim of engineers, public officials, economists, and other interested in avoiding periods of unemployment and industrial depression. This means planning ahead, laying out a long term construction program of public works and determining in advance to push it with added vigor in years when business slackens. This means the creation of a Prosperity Reserve—a reserve to prolong prosperity and to steady employment. It means for cities not to build their maximum of public works during boom years and thus add to the booms and to boom prices. If this policy were put to a popular vote it would doubtless carry because the fear of unemployment, the fear of losing one's job, is begotten of generations of hard experience. But if the voters thought it would involve the postponement of specific local projects, they would probably vote it down because the American public wants what it wants when it wants it. Therefore the voter and the politicians must be convinced that the long range program will not prevent the filling of immediate needs.

A bill introduced in the United States Senate, January 11, by Senator Wesley L. Jones of Washington, (S.2475), should take care of this situation and assure public works construction on a more even scale. This bill, known as the Jones Bill, does not alter present appropriations but authorized appropriations for Federal public works (roads, rivers and harbors, public buildings, flood control, etc.) shall automatically double when, for three months, there has been a 20 per cent fall in the volume of new construction as compared with the average of the same period for 1926 and 1927. In other words, this would provide for a regular program as usual, year in and year out, and an extraordinary program at the first appearance of instability. This general principle has the backing of President Coolidge, Secretary of Commerce Hoover, Secretary of the Treasury Mellon, The Democratic Platform of 1924, the American Engineering Council, The Associated General Contractors of America, the American Institute of Architects, and the American Association for Labor Legislation. The hearing of this bill before the Senate Commerce Committee has been set for April 12. Those interested could help by writing Senator Jones and the Senate Commerce Committee in favor of this bill.

This same principle inspires some of us to put aside the odd penny for the rainy day. Banks are required by law to keep a reserve against runs and other contingencies. A well managed fire insurance company carries a conflagration reserve. A conflagration reserve does not stop a conflagration, whereas a public works reserve does help to stop a depression. Depressions are man-made and can be man-controlled.

The United States Government remains the greatest corporation in the country. It employs more people, it buys and sells more goods and services. And the Federal Government in its turn is but a small employer compared to the vast business of the combined governments of towns and states, all of which can help to stabilize business and unemployment by the same method.

A Prosperity Reserve Committee is being formed which will press the Jones Bill and the general principle, and bring it before the public and the men in the construction industry. There is perhaps no group more anxious to maintain the prosperity that the country is now enjoying than the contractors and builders. Nobody desires a repetition of 1921.

ACKNOWLEDGMENT: From an address delivered by Otto T. Mallory, Chairman of the Industrial Relations Committee of the Philadelphia Chamber of Commerce, before the American Academy of Political and Social Science, Philadelphia, Pa.



# DOBBIE FULL ROTATING DERRICK



Working for The Foundation Company of New York on the foundations of the 42 story Union Trust Co. building in Detroit, Mich., two Dobbie Full Rotating Derricks did the work of five or six of the ordinary stiff-leg type.



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# Legal Points for Contractors

*These brief abstracts of court decisions in the contracting fields may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney*

Edited by A. L. H. Street, Attorney-at-Law

## More About Unexpected Obstacles in Soil

**B**EING evidently prompted by reading an article in this Department in the January, 1928, issue of *CONTRACTORS AND ENGINEERS MONTHLY*, a paving contractor requests a citation of court decisions bearing upon the following stated situation: He contracted to pave certain streets, bidding upon an assumption that the excavation involved in constructing storm water inlets and catch basins would be earth excavation only. The engineer's estimate of cost was based upon the same assumption, and there was nothing to the contrary in the plans and specifications. The contract compensation agreed upon was so much for catch basins, so much for inlets, and so much per linear foot for sewer connections.

The contractor unexpectedly encountered rock in excavating for these structures. He notified the engineer that a bill for this rock excavation would be filed. As the work proceeded, the engineer measured the rock excavation and approved the contractor's bill. The municipal authorities, however, refused to allow the bill, because solid rock was not mentioned in the contract.

If the contractor can establish his claim that the estimate on which bids were received and the contract was awarded to him, was based on a mutual assumption that only earth excavation would be involved, and if there is nothing in the contract or specifications to the contrary, it would seem that he has a good chance of establishing a claim for extra compensation under the court decisions cited below:

### EARTH EXCAVATION IN MISSOURI

In one of the earliest decisions on this subject (*Shepard vs. St. Charles Western Plank Road Co.*, 28 Mo. 373), it appears that a road grading contract provided for the payment of "sixteen cents per cubic yard for all excavation of earth," etc. In doing the work, the contractors, unexpectedly to both parties, encountered a large quantity of indurated earth and cemented gravel. The Missouri Supreme Court decided that the contractors might recover the reasonable value of their labor in excavating such material. The court remarked:

"Although by the terms of the contract the defendants were bound to make all the excavations necessary for grading the road, of whatever material they were composed, yet it does not follow that the price for removing one kind of material was that agreed upon for every kind. The obvious and most natural sense of the words 'excavation of earth,' is the ordinary earth; for if it was intended by the word 'earth' to include all materials whatever found beneath the surface of the ground, there would have been no necessity for any specification of the material, for the word 'excavation,' without any other limiting its signification, would have been most appropriate to express the minds of the parties. . . . As among contractors and engineers the terms 'excavation of rock,' 'excavation of indurated earth or gravel' and 'the excavation of earth,' meaning ordinary earth were known, signifying different kinds of work varying greatly in cost, can anything be plainer than that the use of one of these terms is an exclu-

sion of the other? . . . From the evidence of the engineer it appears that he was of the opinion that it would be right to pay the plaintiffs an extra compensation for excavating the indurated gravel."

A contract to prepare a building site required the contractor to do "all the excavating, grading," etc., for a lump sum. The New York Supreme Court affirmed a judgment in his favor for extra compensation for blasting rock, for reasons stated as follows (*Hellwix vs. Blumenberg*, 7 N. Y. Supp. 746):

"The defendant claims that the blasting is included in the written contract under the term 'excavating,' and that no extra charge can be made therefor. The proof is to the effect that when the existence of a large mass of rock was discovered this question arose between the parties. It was then agreed that plaintiff should blast the rock, and the expense thereof should be borne equally by the parties. . . . We do not think that blasting rock is so clearly included in the term 'excavating' as to raise any suspicion of plaintiff's good faith when at or near the beginning of his work he insisted on his interpretation of the contract. The question of the interpretation was a fair one, and seems to have been settled by the parties at the time in a fair way. That settlement was properly sustained by the court below when plaintiff was allowed judgment for one-half the expense of blasting."

### LEDGE OF ROCK ENCOUNTERED IN MASSACHUSETTS

A contract to excavate all "soil, earth, and stones," involved in constructing a cellar, did not obligate the contractors to remove a ledge of rock encountered in the work, held the Massachusetts Supreme Judicial Court in the comparatively recent (1916) case of *Howard vs. Harvard Congregational Society*, 112 N. E. 233, where the court said:

"If the plaintiffs had been required, under the contract, to excavate for the cellar without reference to any particular kind of material that might appear under the surface of the earth in making the excavation, then the principle stated in *Branel v. Inhabs. of Millbury*, 167 Mass. 16, 44 N. E. 1060, . . . would apply. . . .

"As the plaintiffs removed the ledge, and as it involved labor which the defendant was obliged to perform or to furnish, the question remains whether the plaintiffs are entitled to recover therefor. The defendant contends that it is not liable as no written order was given by the architect to the plaintiffs, as required by article III. . . . The removal of the ledge cannot be considered as an 'alteration' in the work under article III. This work was not originally contemplated by the parties but is to be treated as work wholly extra and entirely outside the scope of the contract. . . .

"If it be assumed that the defendant understood the work of removing the ledge was done by the plaintiffs, under, and as a part of, the contract, still it was bound as a matter of law to know the terms of the contract which it had entered into, and so is charged with knowledge that the plaintiffs were not required to excavate the ledge."

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## TUNNEL EXCAVATION IN UTAH

In the case of *Sartoris vs. Utah Construction Co.*, 21 Fed. (2d Series), 1, decided by the United States Circuit Court of Appeals, Ninth Circuit, August 1, 1927, it appeared that a contract to construct a railroad tunnel was based on specifications which read that "Part of the tunnel excavation at each end is expected to be in earth formation, and the remainder in solid rock, with possibly a short distance in loose rock, or a combination of all three." Shortly after work was begun, fine sand extending along most of the line of the tunnel was encountered. This rendered the original plans impossible of execution and new ones were furnished and the contractor proceeded, the railway company knowing that he expected extra pay. Holding that he made out a case entitling him to recover, the court said:

"True though it may be that it [the railway company] was without conclusive knowledge of the character of the formation when it let the contract, we are of the opinion that the language above quoted from the specifications is to be taken as a representation or assurance on the part of the railroad company upon which plaintiff had the right to rely. These specifications were prepared by the company, and, if ambiguous, are to be construed against it. . . . The only conceivable purpose of inserting the statement must have been to influence bidders and effect bids. . . .

"As we read the language, it was equivalent to saying to prospective bidders or contractors, 'You may bid in the expectation,' or, 'In submitting your bids and in contracting, you may assume, that part of the tunnel excavation will be in earth formation and the remainder will be in solid rock, with possibly a short distance in loose rock, or a combination of all three; and by referring to the accompanying drawings you will see that the design is suited to such, and only such, a formation.'"

## CONSTRUCTING A BARGE CANAL IN NEW YORK

Before contracts for constructing a barge canal were awarded by the state of New York, it caused to be made, as required by statute, a full investigation of the nature of materials to be excavated, and furnished what purported to be accurate estimates of excavating costs. The time intervening between the advertising for bids and award thereon did not afford adequate time for a thorough investigation by the successful bidder. The state's engineers knew that the estimates were false and intended to be deceptive. Under these circumstances, the New York Court of Claims decided in the case of *James Stewart & Co. vs. State*, 201 N. Y. Supp. 334, that the contractor was entitled to recover from the state the extra expense entailed by reason of encountering hard materials not shown on the plans but known by the state to exist. It was further held that the contractor's rights in this regard were not defeated by reason of a recital in the contract that the contractor's estimates were based on its own investigations and that it would make no claim on account of erroneous estimates or representations by state officers or agents.

## ALLUVIAL STREAM IN ALABAMA

The case of *Christie vs. United States*, 237 U. S. 234, decided by the highest court of the land, involved a contract to construct locks and dams in the Warrior river, Alabama. The court held that the extra expense over what would have been necessary had the character of the materials to be penetrated and excavated been such as was represented by the government boring sheets should be allowed to the contractors for construction in an alluvial stream where, the time not being sufficient for the contractors to make their own borings, they relied upon the government borings, which the specifications falsely represented 'as far as known' the material to be excavated, although such specifications further provided that bidders must inform and satisfy themselves as to the nature of the material.

But it is to be borne in mind that in each of the cases

above cited the contractor was held to be entitled to extra pay because there was some peculiar ground or grounds that would have made it inequitable for the court to have decided otherwise. Therefore, these decisions are not necessarily out of harmony with court decisions in other cases where contractors have been held to have no right to recover. In the Missouri case above cited, the decision was merely that where a contract specified so much per yard for excavating "earth" that did not limit the contractor's pay for excavating indurated earth and cemented gravel. In the first New York case cited, the decision, in substance, was that a contract to "excavate" did not so clearly cover blasting rock as to make it unfair that the parties agree that an extra allowance be made for blasting rock. In the Massachusetts case, removal of ledge had not been contemplated, for all that the contractor had agreed to remove were "soil, earth and stones." The court distinctly noted that if the contract had required excavation "without reference to any particular kind of materials," there would have been no right to extra compensation. In the railroad tunnel case, the railroad company was held to be liable because it had virtually warranted what kind of material would be encountered. In the New York barge canal case, there was an actual deception of the contractors. In the Warrior river case, the contractors were similarly misled. And in some of these cases, the contractor's lack of time or opportunity to make independent borings was a factor in reaching a decision in his favor.

As stated by a New York court (*Kuhs vs. Flower City Tissue Mills Co.*, 171 N. Y. Supp. 688), "the ultimate guide in determining whether or not there can be a recovery for the extra cost of doing work under a contract is the contract itself. It is always a question of intention of the parties, and it is this fact which gives rise to the difficulty of reconciling some of the decisions." "No two contracts are exactly alike, and a difference in the language may make inapplicable a decision under some other contract. It may be said, however, that if there are positive representations in a contract as to the conditions, character or nature of the work amounting substantially to a warranty, there may be a recovery based on such representations." Citing two decisions of the highest court of the land as having decided the last stated proposition, the New York court added:

"This may be true even though the contractor was required to make investigations and satisfy himself upon these matters. On the other hand, the representations may be such that it was clearly the intentions of the parties that the contractor should rely upon his own investigations and examinations, and in such cases he cannot recover upon the representations."

## HARD STRATUM IN LOUISIANA SOIL

In the case of *O'Leary vs. Board of Port Commissioners*, 71 So. 139, the Louisiana Supreme Court refused to allow extra pay for unexpected difficulty encountered in driving piles for buildings, on account of a very hard stratum in the soil. The decision was grounded upon notice to bidders to examine the location and a clause in the contract specifying that no additional compensation would be allowed if unusual difficulties should be encountered.

Determining rights under a sewer construction contract, the Missouri Supreme Court said in the case of *Norton, Head & Denneen*, 253 S. W. 372:

"As a general rule, labor and materials cannot be classed as extras for which a contractor may recover, where they are incidental and necessary for the execution of the contract. . . . In the *Fruin Case*, the contractor was to make excavations at a certain stipulated price for direct, and at a certain stipulated price for solid rock. In excavating he struck flint rock and wanted to charge extra for it because of its hardness. Plaintiff was led to believe that the only solid rock he would encounter would be limestone. The Court held that the plaintiff was bound by his contract to excavate the flint as solid rock, although the evidence was that it was worth four or five times as much to excavate flint rock as limestone."



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N-796-L

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## SEWER EXCAVATION IN IOWA

A contract bound the contractor "to furnish at his own expense all necessary material and labor, and excavate and build" a certain sewer. The Iowa Supreme Court decided that he was not entitled to extra pay for unanticipated rock excavation (*McCauley vs. City of Des Moines*, 48 N. W. 1028), saying:

"He was bound to make the excavation without regard to the character of the substance to be removed, whether clay, sand, quicksand, hard-pan or stone. The fact that the excavation required labor which did not enter into the contemplation of the parties when the contract was made will not excuse a

performance for the consideration agreed upon. The facts were equally within the knowledge or means of knowledge of each of the parties, and they must be held to its performance, and are not entitled to relief from hardships against which no relief can be predicated from the agreement."

The court went so far as to hold in that case that the contractor could not be permitted to show that both parties to the contract supposed that there was no rock formation in the line of the proposed sewer. It may be seriously questioned whether this decision handed down more than thirty years ago would be followed by many courts, so far as the last stated proposition is concerned.

## Highway Contractor's Bond Protects Those Who Furnish Trucks and Cart Materials

A New Jersey statute requires contractors for county improvements to give bonds to pay the lawful claims of materialmen, laborers and subcontractors. Interpreting this law, the New Jersey Supreme Court holds, in the case of *Hammill vs. Commercial Casualty Insurance Co.*, 137 Atlantic Reporter, 884, decided April 22, 1927, that a bond given by a highway contractor is available to those furnishing and driving trucks in the carting of stone and sand on a road job. The Court said:

"One who carts stone and sand for use in improving a road in as much entitled to a lien as would be a hodcarrier who carries bricks to the top floor of a building for the purpose of being laid by another."

## Status of Altered Checks

The contractor who uses a pencil in making out checks, or who leaves spaces on them that facilitate alteration, should find some gratification in knowing that if some crook happens to raise the check, strong judicial authority can be found to uphold the right to shift the loss to the bank on which the check is drawn. But the depositor who would rather spend a little ink and care in the drawing of checks than help support the lawyers will probably still continue to be careful, perhaps even to the extent of using so-called check protecting devices.

An interesting decision on this point is to be found in the case of *Glasscock vs. First National Bank*, 266 South Western Reporter, 393, decided by the Texas Supreme Court Nov. 26, 1924.

Plaintiff drew a check written in pencil for "\$5.00, five dollars;" a space being left between the "five" and "dollars." When her son-in-law, the payee, presented the check the next day for payment the "\$5.00" had been changed to "\$500" and the word "hundred" had been inserted after the "five."

The bank attempted to thrust upon plaintiff the loss resulting from cashing the check on the ground that her negligence was the direct cause of the loss, but the Supreme Court said no. The court adopted the following quoted reasoning from a decision of the Iowa Supreme Court:

"But could it be anticipated that such negligence would cause another to commit a crime, and can it be said a person is negligent who does not anticipate and provide against the thousand ways through or by which crime is committed?"

## Owner Liable for Unguarded Condition of Elevator Shaft

A workman on a New York building fell through an open doorway of an elevator shaft and was killed. The accident was due to failure to comply with a requirement of the New York Labor Law that such openings be guarded. It was held that the owner, but not a contractor to install elevator signals and door closers, was liable. (*Lotocka vs. Elevator Supplies Co.*, 158 N. E. 874, decided Nov. 22, 1927.) The court said:

"The Geo-Ted Realty Corporation was the owner of the premises, and was in possession and control of the building thereupon which was in the course of erection. It employed a construction superintendent 'to see that the contractors did the work they were required to do under the direction of the architect,' and 'to see that the work was properly performed

according to the Building Code and Labor Law.' Under these circumstances it was the clear duty of the Geo-Ted Realty Corporation, under the statute, to guard the opening to the shaft. . . . It seems equally clear that no such duty rested upon the Elevator Supplies Co. That company was not engaged in 'constructing' buildings. It did not have possession and control of the building. It had no authority or control over elevator shaft No. 5. In *Rooney v. Brogan Construction Co.*, 194 N. Y. 32, 36, 86 N. E. 814, this court said:

"The statutory duty was imposed only upon the person, who had the possession and control of the building, and that the duty was jointly imposed, only, where both owner and contractor could exercise control."

## Contractors as Partners

When an Iowa bank became bankrupt it held a partnership note, a partnership deposit, a note of one of the partners individually, and his individual deposit. There was no dispute as to the firm's right to offset against the firm note the amount of its deposit, nor as to the right of the individual member to offset against his deposit the amount of his note. But the receiver of the bank would not concede that there was a right to offset against the firm note the balance of the individual member's deposit after offsetting his individual note. The receiver claimed that the firm note must be paid in full, subject to offset of the amount of the firm deposit, and that the individual partner would have to prove up his claim for the balance of his deposit, after deducting the amount of his individual note, and share pro rata with the other creditors of the bank in distribution of the assets.

But the Iowa Supreme Court decided (*Boeger & Buchanan vs. Hagen*, 215 North Western Reporter, 597, October 18, 1927), that the receiver was wrong; that the individual deposit should be offset against the firm note. The ground of the decision is that a partnership debt is the debt of the individual members composing the firm.

## Right to Interest on Money Wrongfully Withheld

Where a subcontractor broke his contract to do base course work on a state highway, entailing upon the principal contractor the necessity for expending money in completion of the contract in excess of current payments, the subcontractor and his surety became liable for interest on such amounts, according to the view taken by the United States Circuit Court of Appeals, Fifth Circuit, in the case of *New Amsterdam Casualty Co. vs. W. T. Taylor Construction Co.*, 21 Federal Reporter, 2d Series, 1002, decided Nov. 5, 1927. The court said: "If the condition of the bond had not been broken, plaintiff would have had the use of its money. Interest is the compensation allowed by law, or fixed by the parties, for the use or detention of money."

## Gifts to Employees as an Income Tax Item

A decision of the United States Board of Tax Appeals recognizes the right of an employer to credit in his income tax return for money paid to his employees at Christmas time, if the payments were intended as a bonus rather than a mere gift. (*McCoy-Brandt Machinery Co. vs. Commissioner of Internal Revenue*, 8 U. S. B. T. A. Rep. 909.)



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# Construction Industry News

The Caterpillar Tractor Co., San Leandro, Calif., has announced a radical price reduction, ranging from 8 per cent to over 11 per cent and representing a cut of \$400 in the price of the largest size of the "Caterpillar" tractor to a reduction of \$175 in the price of the smallest model, the 2-ton.

Frank A. Peck, Vice-president of The Universal Crane Co. and of The Thew Shovel Co., was recently elected a Director of the Manufacturers Division of the American Road Builders Association in recognition of his work and cooperation in contributing to the success of the 1928 Cleveland Road Show, to serve during the year of 1928. The success of the Show was the result largely of the work of a group of Cleveland manufacturers who looked after a multitude of the details, and Mr. Peck, as Chairman of the Executive and Hotel Committees, greatly aided in taking care of the people who attended the Show.

The Climax Engineering Co., 71 West 18th Avenue, Clinton, Iowa, has announced the appointment of the Equitable Equipment Co., 410 Camp Street, New Orleans, La., as a Climax sales and service representative for the territory of lower Louisiana and Mississippi. This new distributor will maintain a stock of standard engine units and a complete assortment of repair parts for all models of Climax "Trustworthy" engines.

The Association of Asphalt Paving Technologists held its annual meeting on January 12, 1928, at the Hotel Statler, Cleveland, Ohio. At that time the following officers were elected and Chairmen appointed: President, Leroy M. Law, New Orleans, La.; First Vice-president, Walter J. Emmons, Ann Arbor, Mich.; Second Vice-president, Prevost Hubbard, Asphalt Association, New York; Secretary-treasurer, Charles A. Mullen, Montreal, Canada; Chairmen of Committees, Present Practice, W. L. Hempelman, Chicago; Research Problems, Prevost Hubbard, New York; Subgrade Problems, Roy M. Green, Lincoln, Nebr.; Professional Problems, Francis P. Smith, New York. It was the sense of the meeting that the next annual meeting should be held at the time and place of the Asphalt Conference. No final decision was made.

The Natural Rock Asphalt Corporation has announced that Joseph R. Draney has been appointed its General Sales Representative. Mr. Draney was one of the organizers of the Asphalt Association and President of that organization until 1925. He was formerly General Sales Manager of the United States Asphalt Refining Co., and the Bitoslag Paving Co. The Natural Rock Asphalt Corporation recently moved its general offices from Owensboro, Ky., to 223-224 Speed Building, Louisville, Ky. This company produces rock asphalt from quarries in Edmonson County, Ky.

The Orton Crane & Shovel Co., Chicago, Ill., recently held its annual meeting at Huntington, Ind., reelecting P. A. Orton, Sr., President and General Manager and Harry Shaffer, Treasurer. P. A. Orton, Jr., formerly in charge of sales in the Chicago territory, was elected Vice-president and Sales Manager, and Herbert Mertz was elected Vice-president in charge of sales in the New York territory. Alex Orton, works manager at Huntington, Ind.; C. C. Case of Chicago; and J. L. Kenower of Huntington, were also elected members of the Board of Directors.

The Northwest Equipment Co., Inc., has announced that on February 15 it moved its general headquarters and office from 14 West Granite Street, Butte, Mont., to Great Falls, Mont. Its mail address is Box 1112, Great Falls, Mont.

The National Paving Brick Manufacturers Association, Chicago, Ill., has announced through its President, F. L. Manning, that a committee of engineers has been appointed and authorized to proceed with such surveys, tests and investigations on highway construction as would result in developing and codifying existing knowledge and be of benefit to road users and road builders. The committee is composed of William H. Connelly, Chairman, Past-President, American Road Builders Association and Engineering and Chief Executive of the Pennsylvania State Highway Department, 1923-27; Warren A. Neel, State Highway Engineer of Georgia, who as State Highway Engineer has had supervision of approximately \$60,000,000 in road and bridge work; Perry J. Freeman, Highway Testing Engineer, who organized the State Highway Testing Laboratory of Kansas; and Frederick J. Cellarius, Consulting Engineer of Dayton and formerly Engineer for that city.

H. M. Davison, who has been with the Hayward Co., New York, for a number of years and for the last seven as General Manager of Sales, is leaving that organization. Mr. Davison's future plans will be announced at an early date.

The Armco Culvert Manufacturers Association, Middletown, Ohio, has announced the appointment of Dr. George Ladd, heretofore Economic Geologist, U. S. Bureau of Public Roads, as consulting geologist for the Association. By this appointment the services of Dr. Ladd become available to all public and private officials who are confronted with difficult and unusual landslide, subsidence, drainage and similar problems. His headquarters will be at Middletown, Ohio.

The Cal Division of the North American Cement Corporation, on March 1 moved its headquarters from Hagerstown, Md., to the general sales offices of the corporation, 285 Madison Avenue, New York. Richard H. Catlett, Manager of the Cal Division, will be transferred to New York in his present capacity.

Howard W. Winton, General Branch Manager of the Heil Co. and Secretary of the Hydro Hoist Co., Milwaukee, Wis., died suddenly on February 7, in Milwaukee. Mr. Winton had been with the Heil Co. since 1919. He was ill only a few days, and died from pneumonia. Mr. Winton had a wide circle of friends throughout the country, particularly in the construction industry. He was 33 years old.



The Arkansas Road Equipment Co., formerly located at Little Rock, Ark., has moved to 489 South Main Street, Memphis, Tenn., having taken over the Memphis branch of the Russell Grader Manufacturing Co. J. A. Riggs is Secretary and Manager.

The Armco Culvert Manufacturers Association, Middletown, Ohio, has announced that J. S. Neibert, formerly Road Construction Engineer, Indiana State Highway Department, has been appointed District Engineer for the Association in charge of work in Illinois, Indiana, Michigan and Kentucky.

**The only  
100%  
cast iron  
pipe  
is  
Universal  
Pipe . . .**

**Tight  
joints  
that  
stay  
Tight !**



**UNIVERSAL PIPE**

No bell holes to dig. No joints to calk.

**THE CENTRAL FOUNDRY COMPANY**

Subsidiary of The Universal Pipe and Radiator Company  
Graybar Building, 426 Lexington Avenue

Chicago Birmingham New York Dallas San Francisco

**A**ll jointing materials unnecessary. No bell holes to dig. No lead to pour. No lead substitutes. Nothing to deteriorate—nothing to work loose in these *flexible* machine-tapered

iron-to-iron joints—*joints as tight as the wall of the pipe itself.*

Laid anywhere in any season. Straight lengths laid on curves. Wrenches the only tools.

Thousands of miles installed every year for water supply, fire protection and sewage disposal. Put your problems up to our nearest office.



## The Cementation Method of Stopping Water Leaks in Rocks

**T**HE term "cementation" is applied to high pressure injection of liquid cement mixture in the cavities, fissures, pores or cracks so that they are completely filled, rendering the rock a structure impermeable to water. In Europe and more particularly in Great Britain, the process has been developed by the Francois Cementation Co., and practically all the important wet shaft sinking operations have been carried out by this method.

Ordinary grouting has been and still is a very useful aid in various engineering works, but its application is limited and presents difficulties. The features of the Francois process are, that a continuous stream of grout is pumped at pressures ranging up to 3,000 pounds per square inch by a machine under control and the fissures are rendered more tractable to the reception of the grout by the lubricating action of a patented chemical process so that the finest hair cracks are sealed.

Apart from tunnels and shafts in wet ground, this process has proved sound and economical in preparing the underlying rock for reservoir construction and avoiding deep core wall trenches, sealing leakages in existing reservoirs and culverts, the conversion of gravels into concrete and the consolidation of defective foundations.

The Francois Co. is employed in such work as the restoration of St. Paul's Cathedral, the Mersey Tunnel and a substantial part of their contract work has been for the London Tube subways, in addition to the corporations of many leading cities such as Glasgow, Birmingham and Manchester, England.

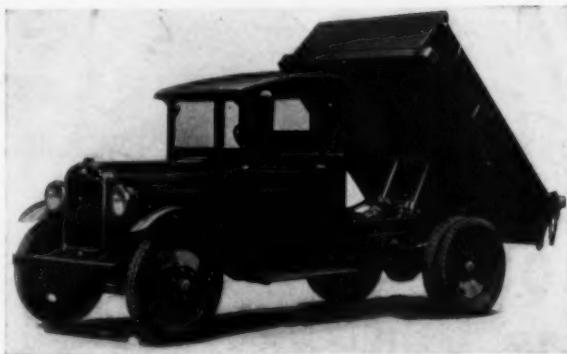


*Masonry from St. Paul's Cathedral, London, Showing Interstices Filled by Grout Under Pressure—the Dark Portion Is Cement*

The Dravo Contracting Co., Pittsburgh, Pa., has a record in shaft sinking that is unsurpassed in the United States and the range of its activities and the diversified problems have resulted in an arrangement with the Francois Co. for the application of cementation in North America. J. S. Crawhall has recently come from England to join the staff of the Dravo Contracting Co. to foster this work.

## A New 2-ton Truck

**I**N the newest truck of Graham Brothers, Detroit, Mich., the truck manufacturing division of Dodge Brothers, Inc., sturdiness, compactness and unusual ability combine to make it a worthwhile road builder's truck. Its outstanding features are a 6-cylinder engine, 4-speed transmission, 3 optional rear axle ratios, 4-wheel Lockheed hydraulic internal



*The New Graham Brothers 2-ton Road Builders Truck*

brakes, 114-inch wheelbase and a frame of 7½-inch depth. The rated speed is 35 miles per hour.

The engine is a Dodge Brothers 6-cylinder, with 3½-inch bore and 4½-inch stroke. The engine, which is an L-head type, develops 55 brake horsepower in actual service. The 7-bearing crankshaft is inherently balanced. It is completely machined and has a total main bearing length of 11 inches. The oiling system is of the force-feed type, delivering oil under pressure to all main, connecting rod and camshaft bearings as well as to the front end silent chain. The pistons are aluminum alloy with Invar metal struts, permitting their fitting with minimum clearance. Exhaust valves are one-piece silchrome steel, while the intake manifold has a hot spot. Ignition is by battery and distributor and an electric starter and generator are standard equipment.

The clutch is the single, dry-plate type, while the 4-speed transmission has ball bearings on the mainshaft and roller bearings on the countershaft. Gears are of alloy steel varying in width from 27/32 inches to 1-3/16 inches. The transmission low ratio is 6.5:1. Unit power plant construction is used. The spiral bevel gear rear axle has a straddle-mounted pinion and dual Timken roller bearings at the wheels. A cam and lever type steering gear and roller bearings at the steering knuckles insure easy steering.

The maximum depth of the frame is 7½ inches. The rear cross member is of a special tubular type, while the frame is dropped behind the rear axle for convenience in use of dump bodies.

The front pneumatic tires are 32 x 6 inches, the rear, 34 x 7. Standard equipment includes front bumper, nickel-plated radiator shell and filler cap, front fenders, short running boards and splash shields, tire carrier, electric head, tail and stop lights, electric horn, and complete tool kit. Two standard dump bodies are offered—a gravity and a hydraulic type, both 1½-cubic-yard capacity.

## An Improved Dual-blade Motor Patrol

**B**UILT primarily to meet the demand of road builders and highway departments for a machine to maintain roads and remove "corduroy," the C. D. Edwards Manufacturing Co., Albert Lea, Minn., has improved its maintenance machine by the application of two blades.

By making one-half of the cut with the front blade and the balance with the rear blade, the machine has, according to the manufacturers, 80 per cent less tendency to vibrate than when the whole load would be cut with one blade only. It is also pointed out that with a single blade machine the blade follows the contour of the road, taking out as much of the low places as it scrapes from the high spots. With dual blades, one blade acts as the wheelbase for the other, thereby preventing either the front or the rear blade from dropping in the low holes. Each blade is mounted rigidly to one heavy, high-carbon



*Photo Metropolitan  
Museum of  
Art, N.Y.C.*

**FOR** nearly twenty-five centuries, this Greek warrior, fashioned of bronze, has victoriously fought corrosion. Bronze is used in Neptune-built meters for the same purpose.

***Of Trident and  
Lambert Meters,  
over 4,500,000  
made and sold  
the world over.***

*The eight outstanding  
pioneering develop-  
ments in water meter  
design were all Tri-  
dent. Write for cata-  
log giving full details.*

*Pioneers in Meter Progress*  
**NEPTUNE METER CO.**  
THOMSON METER CORP.  
50 East 42nd St., New York City  
Factory, Long Island City, N. Y.

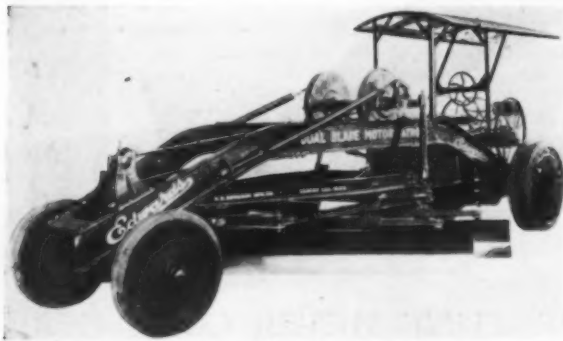
*The Cash Registers of  
the Water Works Field*

beam, thereby making it impossible for one blade to drop into low places without the other also doing the same.

Both blades are always parallel and can be angled at 45 degrees, either to the right or left. The blades are also extendable so that the machine can cut a 10-foot swath or a 13-foot swath just as the operator desires. It is recommended in the spring of the year that the two blades be placed one behind the other when the heavy work on the roads must be done, and after the roads are put in better condition the blades are extended to cut any width of road bed desired, up to 13 feet, in one cut.

The blades can also be tilted independently of the other thereby allowing the front blade to do the cutting and the rear blade to do the smoothing or troweling. Or, in case the operator wishes both blades to be tilted forward to do troweling only, the adjustment can be obtained easily by two simple adjustments.

The 10-20 size McCormick-Deering tractor is used in conjunction with the 15-30 size automobile steer front axle with 32 x 5 front wheels and 40 x 10 either solid tread or dual tread rear wheels. The frame is made of 10-inch channel weighing 25 pounds per running foot, which gives the machine a rigid backbone. The worm and gear are mounted so that a direct connection is effective between the blades and worm gear assembly, thereby throwing all the load from the blades directly on to the worm gear. The hand wheels at the operators platform simply turn the worm which is located at the center of the machine. The lifting gears, which are enclosed



*The Edwards Improved Dual Blade Motor Patrol*

in oil tight cases, and the lifting arms, are made of one homogeneous mass of metal, consequently, there is no possible chance of play between these two.

By using an extra large lifting gear which is 24 inches in diameter, the teeth of this gear are not only large in size to stand wear but also give enormous leverage on the blade to hold it in position. By exerting only one pound pressure pull or push on the hand wheel, the blade assembly will run either up or down.

The weight of this machine, with cab and without scarifier, as shown in the photograph, is 13,000 pounds. The blades will extend outside of the wheels on either side 46 inches.

## A Trough for Use Over Impassable Roads

**A** PRACTICAL solution for moving traffic over impassable roads has been found in Metalrut, a light, portable, curved trough of heavy-gage corrugated metal, made by the Metalrut Co., 2504 University Ave., St. Paul, Minn. State highway departments, and paving, grading and trucking contractors are able to move traffic and haul materials economically and quickly with the use of this equipment.

These troughs, integrally reinforced with rolled edges, are held in a parallel position by corrugated struts. They are built in 10-foot sections for easy handling, stacking and lay-



*A Truck Load of Metalruts on the Way for Use at a Mud Hole or Frost Boil to Keep Traffic Moving*

ing. After leveling off muck or sand so that each trough has a good bearing for its full length, the sections are lapped two corrugations and bolted together, and a continuous track is formed. For continuous use by trucks, Standard Metalrut is recommended for light trucks only. Heavy-duty Metalrut is available for heavier loads.

Hauling material is greatly facilitated over any new fill, loose soil, or subgrade and difficult wheeling is eliminated, when this metal trough is used. It enables hauling and moving traffic through mud holes, frost boils, washouts, snow-drifts, sand-drifts, and other emergencies where, otherwise, traffic would be at a standstill.

## A New Truck for Road Builders

**A** 3-TON, 6-cylinder road builders' truck, the "Trail Blazer," that has been especially designed for the more difficult jobs, has been produced by the Autocar Co., Ardmore, Pa. This is a companion truck to the 4-cylinder HPDS of this company.

The engine is located under the driver's seat, thus providing a short wheelbase of 114 inches, which means a turning circle only 38 feet in diameter.

To enable the truck to go through sand and mud without danger to the important parts, this new truck has a full-floating rear axle, cased in a dirt-proof housing, so constructed that all gears and bearings can be adjusted or lubricated without jacking traffic through mud holes, frost boils, washouts, snow-

The frame of the truck is made of chrome nickel pressed steel, especially heat treated.



*The New Autocar "Trail Blazer," a 3-ton, 6-cylinder Truck*



# The floods are coming!—



PHOTO BY NASHVILLE AERONAUTIC CORP.

THE CUMBERLAND RIVER IN FLOOD, NASHVILLE, TENN.

## —Will you be ready?

**T**HIS spring—as in all other springs—the floods will come. Rivers will overflow.—Surface water supplies will be excessively polluted.—Ground water levels will rise.—Well waters will become contaminated!

Will you be ready?

Will you have a spare W&T chlorinator—and a supply of Liquid Chlorine on hand to render emergency service? Will you be

ready to chlorinate that polluted water and avoid the sure toll of pestilential disease?

Water sterilization—always important—is absolutely vital in times of flood.

But why wait for the flood?

Continuous chlorination costs but one cent per head per year and absolutely prevents water-borne disease.

There is no cheaper public health insurance.

*“The only safe water is a sterilized water”*



### WALLACE & TIERNAN

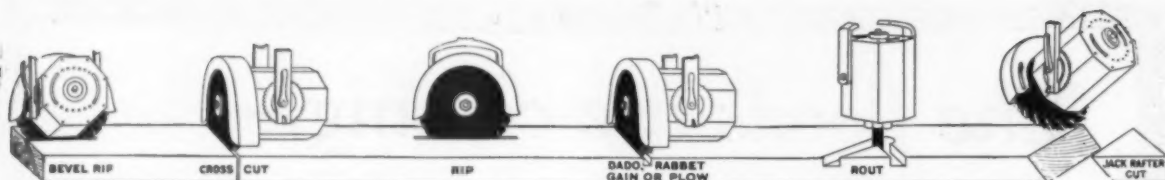
COMPANY, INCORPORATED

*Manufacturers of Chlorine Control Apparatus*

NEWARK - NEW JERSEY



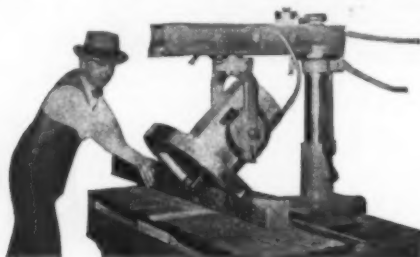
NEW YORK CHICAGO KNOXVILLE SAN FRANCISCO MINNEAPOLIS PITTSBURGH DALLAS KANSAS CITY  
LOS ANGELES SEATTLE ST. LOUIS BUFFALO HARRISBURGH INDIANAPOLIS DETROIT  
WALLACE & TIERNAN, LTD., TORONTO, CANADA WALLACE & TIERNAN, LTD., LONDON, ENGLAND



*Cuts Which Can Be Readily Made with a DeWalt Woodworker*

## A Contractors' Saw with Direct Drive

**A** CONTRACTORS' saw for lower cost concrete form construction, elevator and scaffold building, and all other types of rough woodwork where a speedy, low-cost, heavy-duty saw is required, has been developed by the DeWalt Products Co., Leola, Pa. This "Wonder-worker" has an overhead direct-drive adjustable motor which can be swung into almost any conceivable position, permitting the application of saws, dado heads and cutting tools of all descriptions. It is a portable machine with productive capacity. The manufacturers claim that it is six times faster than hand work on all woodworking jobs and saves 80 per cent in time and costs.



*The DeWalt Electric Saw*

The table is always stationary and adjustments are made through the machine itself or in the parts above the wooden table. This means much to the concrete construction man or on large construction work where material is liable to be all rather heavy, and the 5-horsepower model is built in a way that it can be moved about to every part of the job. On concrete work where a great many sleepers, cant strips and wedges are used, the "Wonder-worker" is of special advantage since it is adapted to any cut.

The feature of direct-drive not only increases power, but reduces the accessory weight that is usually carted around. A few of the more important features are measuring gages that indicate the rip widths, and proper protective switches.

This overhead machine will change from cross-cut to rip instantly without changing the saw or stopping the motor. It uses the fastest principle to cross-cut and mitre—the overhead swing saw cutting parallel to the work—and is accurate on the finest jointed finish.

The blade is mounted directly on the motor shaft. There is no lost motion. With the aid of the tilting motor casing and tool, revolving slide yoke, overarm adjustable for height or to any angle right or left, the saw can be readily swung into any position, yet the work always lies flat on the table, with the layout marks in full view of the operator.

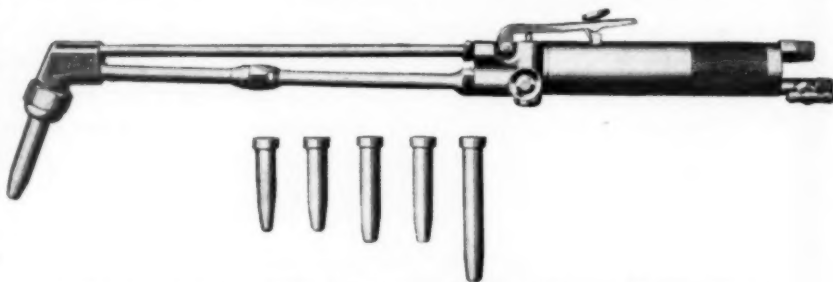
Its light weight is an important feature of this saw. Two men can carry it with ease and it can be shifted from floor

to floor as the work progresses. It simply hooks into a convenient light socket (or power socket in the case of the large machine) and is ready to go to work as soon as the saw is swung into position for the desired cut. It requires the minimum amount of floor space.

## A Combination Cutting and Welding Torch

**A** NEW light-weight combination cutting and welding torch which cuts or welds with the mere interchange of tips, has recently been developed by the Alexander Milburn Co., Baltimore, Md. This torch, known as the Milburn Type-RI, has all of the salient features of the heavier Milburn combination cutting and welding torch, Type-NI, which is the original two-purpose torch, cutting or welding the lightest or heaviest metal within the range of the process by a mere change of the tip.

The Milburn Type-RI torch is light in weight for the wide range of work it performs, weighing only 40 ounces. This weight is advantageous to the operator for continuous work. Some of the important features of the light-weight combination torch as listed by the manufacturers are: the torch has only two gas tubes, made of stainless steel, instead of the three tubes common in other torches; the high pressure cutting oxygen thumb button remains fixed in either open or closed position without sustained pressure from the thumb; the forged bronze torch-head and valves have a tensile strength of 60,000 pounds per square inch; it is designed for strength for severe work and for lightness for continuous operation; it uses the heat to the best advantage while affording protection to the hands of



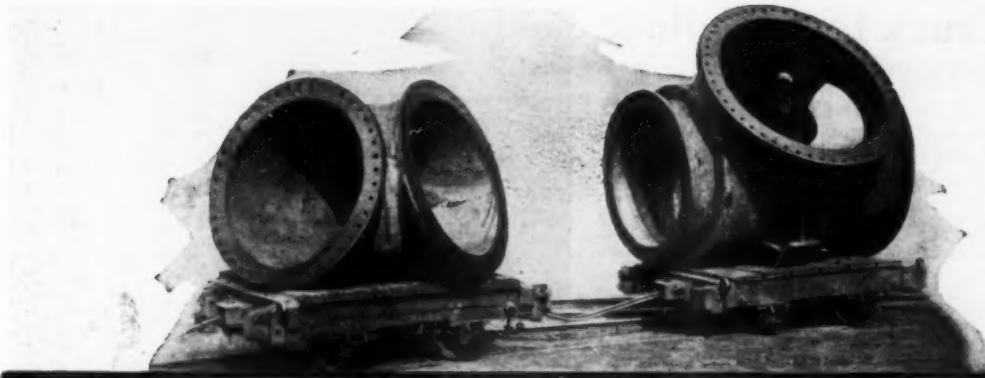
*The Newest Milburn Light-weight Combination Cutting and Welding Torch*

the operator; all valves are readily accessible; it is well balanced, easy to handle and the supermixing of gases results in a neutral uniform flame, as well as the elimination of flarebacks.

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*"The accident prevention problem is very serious. A great number of medium and smaller sized companies are not in a position to organize safety work as a big company is, which can afford to hire a safety engineer, a man to devote all of his time to it. It is a more difficult problem, but it is not impossible."*—James A. Hamilton, Industrial Commissioner of New York State.

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## Large standard fittings and special castings

---



In our various plants we have unusual facilities for handling the largest standard fittings and for making especially heavy castings.

While standard connections should be adopted as far as possible, it sometimes happens that an exception has to be made to meet unusual conditions. When such conditions arise communicate with our

nearest sales office. Our equipment is so complete that oftentimes the castings can be designed to fit equipment already available at one of our plants. This saves the cost and lessens delivery time.



# United States Cast Iron Pipe and Foundry Company

### SALES OFFICES

Philadelphia: 1421 Chestnut St.  
Chicago: 122 So. Michigan Blvd.  
Birmingham: 1st Ave. & 20th St.  
Buffalo: 957 East Ferry Street  
Cleveland: 1150 East 26th Street  
Minneapolis: 6th St. & Hennepin Ave.

New York: 71 Broadway  
San Francisco: 3rd & Market Sts.  
Pittsburgh: 6th & Smithfield Sts.  
Dallas: Akard & Commerce Sts.  
Kansas City: 13th & Locust Sts.

General Offices:  
**Burlington, New Jersey**



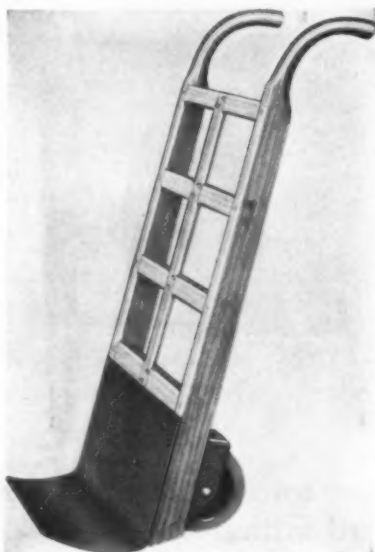
## A New Truck for Handling Cement Bags

**A**N efficient truck for handling cement, plaster, lime and other pulverized commodities in cloth and paper bags, has been put on the market by the Bates Valve Bag Corporation, 35 East Wacker Drive, Chicago, Ill. This 82-pound truck is sturdily built, affording a truck with exceptionally long life.

The design of the truck permits loading with the minimum amount of effort. The bags pile up straight without slipping off the truck. Perfect balance, light weight, and rubber-tired ball-bearing wheels afford greater ease and speed in trucking. No energy is wasted on superfluous weight over rough car floors. The truck also discharges the bags into orderly piles without rehandling.

The wheels of the truck are 8 inches in diameter with  $2\frac{1}{2}$ -inch face and are drop-forged. They are equipped with ball bearings and high quality, heavy, rubber tires. Each wheel is equipped with Alemite fittings affording facilities for adequately lubricating the ball bearings. The nose plate is made of heavy steel with a specially designed curved lip, permitting a rocking effect when discharging the load, making the discharging operation quickly and easily.

Since these trucks have been designed to transport paper and cloth bags, there are no projecting objects such as nuts, bolts, steel straps, or rough edges. The truck has a perfectly smooth face, and there is no possible chance of damage to either paper or cloth bags.



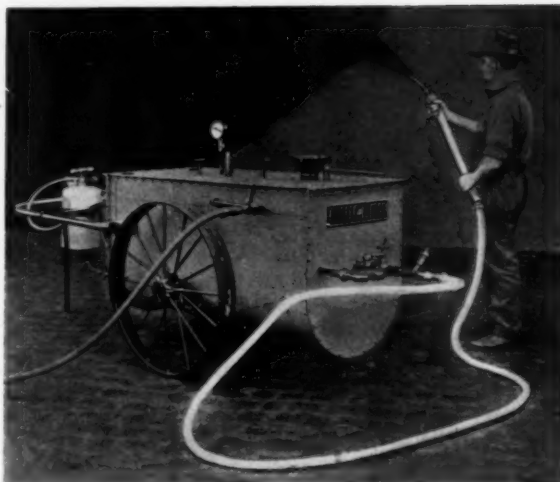
*The New Bates Cement Bag Truck*

## Gun for Applying Bitumens

**A** NEW gun for spraying or shooting liquids of practically any consistency or temperature through special, insulated, metallic hose, any distance up to several hundred feet, has been developed by Quigley Furnace Specialties Co., Inc., 26 Cortlandt St., New York. Volume and pressure are under easy control, assuring uniform coverage, regardless of atmospheric temperature. Ability to control the temperature and thickness of coating makes compliance with the most exacting specifications easy, and permits close estimating of material and time.

Compressed air is never in contact with the material in the gun, nor is it used to form the spray. Atomization is obtained by a purely mechanical process. Fifteen cubic feet of air a minute, at 60 pounds pressure, is sufficient to operate the gun. A small, portable, garage compressor, operated by either gasoline or electricity, will answer where no air supply is available.

This Bitumen gun is an adaptation of the Quigley refractory gun which is used for concrete mixtures and in building concrete structures, stuccoing, plastering, etc. The gun consists



*The Quigley Bitumen Gun Used in Applying a Membrane Coating to a Concrete Wall*

of a cast iron cylinder from which the material is forced by a piston capable of high pressure. The gun is enclosed in a steel housing, mounted on wheels. Its capacity is 15 gallons, enough to cover approximately 400 square feet of surface.

Two unskilled men can operate the gun after a few minutes instruction—one man at the nozzle, the other charging the gun and controlling the air supply.

For hot spraying, preheated material is put into the gun through a charging opening. The vent is then closed by a quick-acting valve and the opening of another admits air pressure back of the piston.

Temperature in the gun is regulated by a small self-contained kerosene burner. A large scale thermometer is always under the eye of the operator. After the gun has been completely discharged, compressor air sends the piston back to the loading position ready for a fresh charge. Reloading the gun requires only a few minutes.

The long hose gives easy access to remote places and permits the location of the gun and melting pot outside buildings. It also eliminates the necessity of frequently moving the gun and melting outfit as the work proceeds. Material is forced through the hose with a drop in temperature of not over 3 degrees for each 25-foot length. The discharge end of the nozzle can be bent at any angle so the operator can reach places otherwise inaccessible.

When the work stops, or the job is finished, the gun can be drained of all unused material and the hose cleaned out.



*Caterpillar Sixty with Bulldozer Handling Fill Near Lincoln Park, Chicago, Ill.*

# CONTRACTORS

LABORERS  $\times$  TIME = DOLLARS



Tying Concrete Reinforcing Bars with Wire Tie and Tying Tool

## BATES WIRE BAR TIES

Will save you time, labor and dollars.  
No skilled labor required to use this equipment.

Two or three turns with tying tool and bars are tied.

Ideal to use in cold weather—men do not have to take off their gloves.

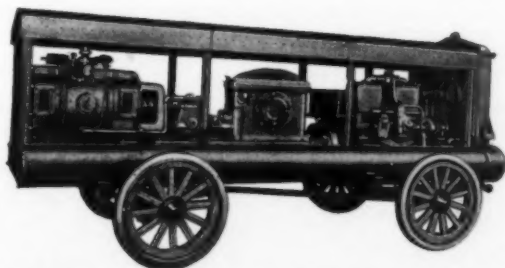
Manufactured by

**BATES VALVE BAG CORP.**

35 East Wacker Drive

Chicago, Illinois

## THE RIGHT COMPRESSOR FOR ALL KINDS OF PNEUMATIC TOOL WORK



READY FOR EVERY JOB---

HORIZONTAL TYPE—DOUBLE  
ACTING—SLOW SPEED—  
STURDY AND RELIABLE—  
LONG LIFE—LOW UPKEEP.

### THE TRAYLOR 12 in. x 10 in. PORTABLE COMPRESSOR

Will operate five rock drills, fourteen chipping hammers,  
or other pneumatic tools in proportion

**Send the Coupon—Now!**

Also write us for information on  
the "Cement-Gun" and "Gunite."

**CEMENT-GUN COMPANY, Inc.**  
Allentown, Pa.

New York      Pittsburgh      Chicago  
Denver      Salt Lake City  
San Francisco      New Orleans      Buffalo

-----

Cement-Gun Co., Inc.      Date.....  
Allentown, Pa.

Please send full information on the TRAYLOR  
PORTABLE COMPRESSOR. ☐

I would like to have your representative call. ☐

Name .....

Address .....

City ..... State.....



*Footo Mixer Equipped with a Hercules Engine*

## Heavy-duty Engines for Pavers

**T**O supply the demand of highway engineers and contractors for heavy-duty, 6-cylinder engines for pavers, the Foote Co., Inc., Nunda, N. Y., has announced the adoption of 6-cylinder Hercules engines as optional equipment of the 1928 MultiFoote pavers.

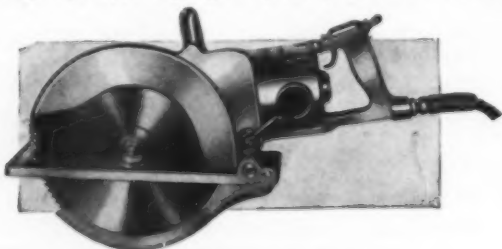
One of the main features of this new unit is the excess power produced by this motor. The type used, Y X C, of 4 $\frac{3}{4}$ -inch bore and 4 $\frac{3}{4}$ -inch stroke, develops 60 horsepower at 1150 r.p.m., the speed at which it is ordinarily operated, but it can develop 75 horsepower at 1480 r.p.m. without harm or excessive vibration.

Other features of the motor are a 7-bearing crank, built-in governor, oil filter, alloy steel cylinder block, and a large 3-inch diameter crankshaft.

Special attention has been given to the problem of efficient cooling and, in the new engines, water, driven by a water pump delivering 46 gallons of water per minute at 1000 r.p.m., is directed in a stream around each exhaust valve. The top of the guide comes close to the head of the valve, thus bringing the jacketed portion of the guide near the valve head. The design of the crankcase gives unusual rigidity, as it is integral with the cylinders.

## A Large Capacity, Electric Hand Saw

**T**HE demand for an electric hand saw of large capacity has led Skilsaw, Inc., 3814-24 Ravenswood Avenue, Chicago, Ill., to produce Model "M," with a 4 $\frac{3}{4}$ -inch cutting capacity, weighing 28 pounds, and built for heavier



*The Model M Electric Hand Skilsaw*

work and to withstand severe working conditions.

This portable saw makes it possible to operate in any corner or location on the job. It requires only enough effort to guide its course, and in operation is almost as light as a carpenter's hand saw. It is necessary only to attach it to any electric light socket and put it to work.

Equipped with swivel base, the saw is adjustable as to depth of cut and for mitre cuts up to 60 per cent. Because



*The Skilsaw in Action*

of its compactness and light weight, it can be operated in any position, vertically or horizontally. It rips or cross cuts. The foot upon which the Skilsaw rests can be adjusted to cut to any predetermined depth. The foot can also be tilted so as to bevel accurately at any angle up to 60 degrees. The saw is also equipped with a special rip fence; there is no necessity to mark the boards.



*Caterpillar Thirty Equipped with Hydraulic Bulldozer Used in Spreading Dirt Delivered by Trucks to the Webster Street End of the Alameda-Oakland Estuary Tube, Calif.*



## Announcement!



**Columbia  
Calcium  
Chloride**  
(77-80%)

for

## Concrete Curing and Road Dust Prevention

Will now be handled direct with the trade from our factories at Barberton, Ohio.

All carload shipments of 3C Calcium Chloride can be made direct from the factory. Quick service on less than carload orders is assured by 40 distribution centers.

*Write today for facts and quotations*

**THE COLUMBIA CHEMICAL DIVISION**

The Pittsburgh Plate Glass Co.

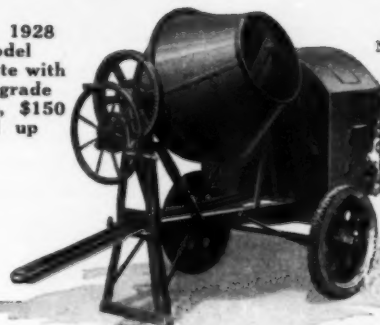
Barberton, Ohio

# Faster Handier Now Ready

**New  
No. 3½  
KWIK-MIX  
TRAILER**

New 1928  
Model  
complete with  
high-grade  
engine, \$150  
and up

Patented  
Nov. 8, 1927



### Featuring the New Friction Tilting Device

An astounding improvement found exclusively on the new Kwik-Mix Trailer. Gives more speed, greater ease, better work. This and other exclusive improvements place the Kwik-Mix far in advance of any other mixer made.

"Greatest improvements I ever saw on any Mixer," say contractors who have seen our new 1928 line.

### Write Today for New Catalog

This remarkably interesting catalog gives full details regarding the new Kwik-Mix Trailers. Page after page describes this high-quality, low-priced line of tilting mixers, plaster, mortar mixers and pumps, products of Pioneer Makers of Mixers. No contractor can afford to pass this opportunity by. Write TODAY.

**KWIK-MIX CONCRETE MIXER CO.**

Port Washington, Wis.

**Most Complete Catalog  
of Late Model  
Low Priced  
MIXERS  
Ever Published**

**Kwik-Mix**  
CONCRETE MIXER

**Kwik-Mix  
Concrete Mixer Co.**

Dept. 50, Port Washington, Wis.

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## A 3-Way Dump Body

**A**N improved hoist and dump body built to fit any motor truck or trailer, and that can be dumped three ways, has recently been developed by The Commercial Shearing & Stamping Co., Youngstown, Ohio. It is built in capacities of  $1\frac{1}{2}$  to 15 tons, and dumps to the rear and both sides at the choice of the driver, who completely controls these operations from the driving seat. Each position is positive, and is locked by a simple safety device while dumping. By using this type of equipment, places heretofore difficult of approach can be reached easily and safely, and backing, twisting and turning to dump the material in the right place, is unnecessary. Instead, the driver can drive up alongside the excavation or dump pile, and discharge the load without leaving his seat.



*Dumping to the Right*

The side gates, which are hinged at the bottom and downfold, permit the load, regardless of its nature or bulk, to discharge over and clear the wheels. These gates do not open until the body has started its upward movement, but at a lift of only 16 degrees they are wide open and remain so during the full range of travel to the limit of the lift. When necessary, these gates can be downfolded without tilting the body,

thereby permitting loading or unloading of materials without lifting them over the sides of the body. A side dumping angle of 54 degrees and a rear dumping angle ranging from 45 to 70 degrees is obtainable with these units.



*Dumping to the Left*

The hoist of this U. S. unit applies

the power directly to the load. The hoist has been so constructed as to be quick acting and easily controlled under all working conditions. It is furnished in a range of sizes and is of the vertical underbody telescopic plunger and cylinder type, mounted on double oscillating trunnions both top and bottom. It is attached to the chassis frame clear of the drive shaft and other truck mechanism. There are few working parts in this hoist. Its full power capacity is available at all times and no angle or twist to which the truck may be subjected will affect its perfect operation.

The 3-way hoist, being self-aligning, is not subjected to any binding or twisting strains or stresses. The cylinders and plungers are made of a special steel to withstand wear and are accurately ground to size. They are provided with a special hydraulic packing which requires little attention



*Dumping to the Rear*

or adjustment. Their design eliminates the necessity for piston rings.

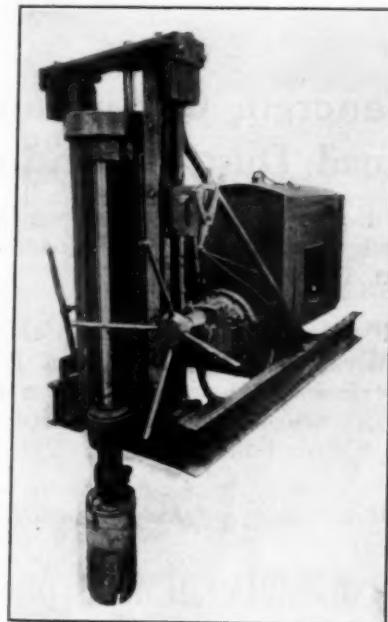
The oil under pressure for operating the hoist is applied to the uppermost end of the plungers, placing the lifting force where it is required. This application relieves the plungers and cylinders of all load strains. Wiper rings are provided for cleaning the plungers as they telescope into the cylinders. All-metal, flexible, armored tubing conveys the oil from the pump to the hoist.

U. S. hydraulic pumps and power take-offs are of the "unit assembly" type, having no clutches, universal joints or open drive-shafts in their construction.

All bearings are deep groove ball and solid roller type, insuring long life and maximum efficiency. All shafts are hardened and ground to close tolerances. The power take-off and pump unit is attached to the transmission. It is operated by a sliding gear meshing with a positive-driven gear provided in all transmissions having power take-off openings.

## A Pavement Core Drill

**A** SELF-CONTAINED pavement core drill that is used to take solid cores of approximately 6 inches diameter from concrete, brick or asphalt pavements, has been developed by the H. C. Nutting Co., Cincinnati, Ohio. Five of these drills have recently been delivered to the Cuban Government, and satisfactory results have been reported. The drill can be mounted on a truck, wagon or trailer. Ample power is furnished the drill with a 11-horsepower, 4-cylinder, Universal motor. The drill is equipped throughout with Timken roller



*The Nutting Self-contained Core Drill Ready for Mounting on a Motor Truck*

bearings and Alemite lubrication. The bevel and spur gears used on the drill are enclosed and run in oil.

The distinguishing feature of this unit is the fact that the drill spindle is mounted on a vertical slide of the milling table type construction. This feature keeps the drill spindle bearing always at the same distance from the point of work, that is the extreme end of the shot-bit. This prevents any wobbling of the shot or cutting bit, thus enabling the cores to be true right cylinders. These cylinders supply material for tests in checking the thickness of the pavement, and in compression tests. The drill is built to be mounted on a  $1\frac{1}{2}$ -ton truck.

## HERE COMES THE SPRING BUYING SEASON AGAIN—

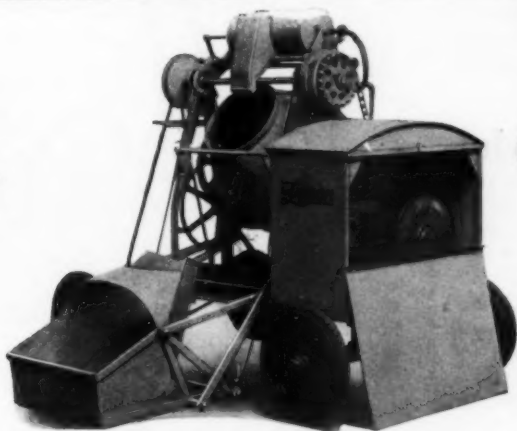


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Truck Cranes

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## *LAUSON* Mixer Compact Simple Rugged

**D**ESIGNED to meet the need for a more compact mixer, while retaining all the elements of simplicity for which Lauson mixers are so well known.

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Roller-Chain Drive; Planetary Clutch; Timken Bearings, Fully Alemite Equipped; Firestone Cushion Tires; can be furnished with Water Tank and Automatic Water Control and Gear Water Pump.

Let us send you full details of this new mixer as well as our other types together with the full Lauson line: Plaster and Mortar Mixers, Contractors Saw Rigs, Gas Engines, 2-35 hp. and 35-45 hp. heavy-duty Power Units.



**THE JOHN LAUSON MFG. CO.,** 11 Jackson St., New Holstein, Wis.





12,500 Feet up in the Rockies and 30 Miles from a Railroad

## Digging in Low Temperature at High Elevations

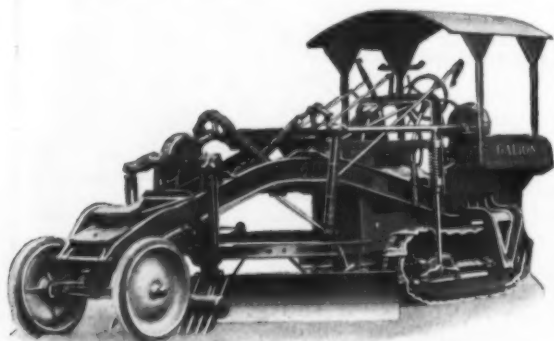
**R** EPORTS have been received recently of a very unusual performance of an Osgood gas shovel working at a high elevation in very cold weather. This machine is operated by S. M. and S. J. Feeley, contractors of Denver, Colo. The machine is a 1¼-yard heavy-duty Osgood gas shovel and has been operating at an elevation of 12,500 feet with the temperature at 45 degrees below zero. The machine is working about 150 miles from Denver and is about 30 miles from the main line of the railroad with the snow ranging from 5 to 7 feet deep.

The contractors are digging a ditch 14 feet wide on the bottom of a 1½ to 1 slope and 7 miles long. The material handled is of granite rock, lightly shot and cast over the lower side of the mountain. The machine has been double shifted the past 90 days and is averaging 770 yards per 8-hour shift in rock. It is believed by the manufacturers that this is the highest elevation and the lowest temperature at which a gasoline shovel has been operated successfully to date. This Osgood machine is equipped with a LeRoi 4-cylinder motor.

## A Tractor-powered Grader

**A** HEAVY-DUTY motor grader with the Caterpillar 2-ton tractor as the power unit, has been produced by The Galion Iron Works & Manufacturing Co., Galion, Ohio. This new grader combines the power, dependability and positive traction of the tractor with the well-known Galion frame, blade and operating parts.

Cast steel brackets form the main attachment between the grader and tractor, while the attachment at the front of the tractor is by means of a spring-mounted yoke. Four clamps and a few control extensions removed, make it possible to



The Galion Heavy-duty Motor Grader with Caterpillar 2-ton Tractor

raise the grader frame and remove the tractor for separate use.

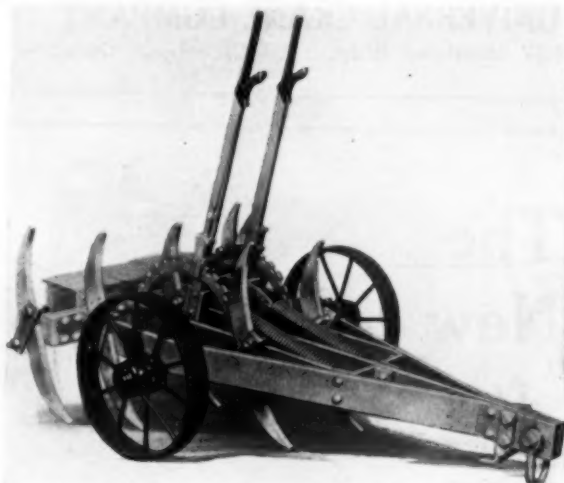
The assembly is simple. The parts include the new firm-balance front block which, while permitting all necessary freedom of motion for the front axle on uneven ground, removes all swinging of the frame on the front axle mounting, which tends to cause uneven blade action.

Machine-cut E-Z Lift gearing operating in oil at the bottom of an oil-tight gear case, sturdy lift springs, 40-inch lift wheels, extra curved mouldboard, in 8-, 10-, 12- and 14-foot lengths, machine-cut worm for side shifting mouldboard, enclosed worm steering gear and many other features combine to make this a very satisfactory and easy operating motor grader.

The field of this grader is extended and its usefulness increased by three very practical attachments. The scarifier, controlled from the operator's platform by machine-cut worm gearing, operates in oil. The snow plow, which is attached to the front end of the grader and operates in connection with the blade, opens a wide path through drifts and fairly deep snow. The multiple blade is attached instead of the regular blade for certain types of maintenance work.

The comfort of the operator on this motor grader has been served not only by ease of operation and accessibility of controls but also by a sturdy shelter cab, with curtains when desired, and heavy fenders over tracks.

Road building contractors and highway officials will find this grader valuable in leveling subgrades, spreading and leveling road surfacing material, leveling fills and similar work. It will also maintain a berm at the sides of paved roads, peel sod from road sides and clean ditches.



The New Lakewood Graderooter Equipped with Double-pointed Teeth

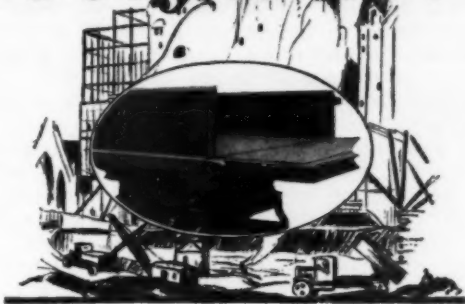
## A Multiple Rooter Plow

**A** N IMPROVED rooter plow, the Graderooter, that is equipped with double-pointed teeth, has been put on the market by the Lakewood Engineering Co., Cleveland, Ohio. It is to be used wherever a rooter plow can be employed. A particular advantage is that it will work close to the forms. It is light enough to be pulled by teams and the manufacturer says it is strong enough to stall the heaviest tractor.

The double-pointed teeth with which this Graderooter is equipped, are made of high grade steel, one inch thick, instead of single pointed teeth three-quarter inch thick. The teeth can be set to root 12 inches deep and 48 inches wide. Ten teeth are furnished with each machine.

Contractors and highway officials will find this new piece of equipment very useful for construction and maintenance work.

# Serving Industry Everywhere



## The New Wood J-1 All-Purpose Body

The new J-1 steel dump body, having steel side braces and new design of tailgate mechanism, is a rugged, quick-operating, all-purpose body.

It has several exclusive features: The tailgate is double-acting and adjustable. The tailgate posts hinge downward with the tailgate, tight-fitting and flush with the body floor, so that with sides removed, it forms an extended, smooth platform body.

As a dump body with sides up and tailgate in closed position, the tailgate hinges open from the top in the usual way and is released by the regular control from the driver's seat.

Built in standard capacities of 1, 1½ and 2 cubic yards. (Special sizes built to order.) Designed primarily for use with F-1 hoist.

For 17 years Wood engineers have designed and built dump bodies to meet the most exacting demands of dump truck users for every purpose and requirement.

Wood service through Factories, Branches, Distributors and Dealers is world-wide.

# WOOD

**HOISTS-BODIES**

Wood Hydraulic Hoist & Body Co.  
Detroit, U. S. A.

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Be sure of dependable water supply. A doubtful pump is a big gamble—a reliable Barnes pump a great safety factor. Compare the Barnes with any other pump for rugged strength, mechanical soundness, simplicity—and water pumping ability. See if you can duplicate all these features on any other pump:

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3. Forged Steel Crank Shaft—not cast.
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5. Roller Bearings on all shafts, including crank shaft.
6. Water cylinders detachable from power end.
7. Rubber tired roller bearing wheels, interchangeable with standard steel wheels.

Barnes Road Pumps again set the pace for 1928. Capacity 60, 80, 100, 150 G. P. M. Pressures up to 500 pounds.

Send for free pump catalog

**The Barnes Manufacturing Company**  
905 Main Street, Mansfield, Ohio



*The Mechanical Man—Himself*

## Minimum Lever Control for Pavers

**A** MECHANICAL device to be attached to a paver and that performs the whole cycle of mixing operations automatically by one lever control, has been developed by the Chain Belt Co., 766 Park Street, Milwaukee, Wis. This mechanical man saves 2,000 manual operations, according to the manufacturers, and is used on the 27-E Rex paver. It has been tested in the field for a year.

The mechanism is simple. Three cams and three levers connected to the skip hoist, the water valves, and the discharge chute, perform all operations with sureness and accuracy. If desired, any or all of the present operations can be performed independently of the mechanical man. By a simple adjustment of the three cams, the automatic timing of all operations can be varied.

Since the dribble in discharging occurs at the last end of the batch, it results in the separation of concrete which is noticeable when discharging the last few feet of concrete from the drum. Shutting off the discharge at the end of the 8 or 10 seconds eliminates this dribble and prevents the separation of the fine and coarse aggregates at the last end of the discharge. This is accomplished by the following process: when discharging the entire batch, the discharge buckets cut through a large homogeneous mass of concrete during the first few seconds of the discharge period (during this period they pick and carry their full capacity) but during the last part of the

discharge period there is a gradual tapering off of the amount of concrete in the drum, which the buckets can pick up. This results in a gradual slowing up and a dribble and separation of concrete in the discharge of the last part of the batch, when attempting to discharge all of the concrete from the drum.

The mechanical man regulates and controls the discharging action. It discharges full batches of uniformly mixed concrete in 8 seconds by automatically shutting off the discharge at the end of a fixed period, and carrying over a constant amount of concrete into the next batch.

Field tests show that the action of this device in shutting off the discharge in 8 seconds insures the discharge of a fixed amount of concrete equal to the amount which is added in each successive batch. The Rex automatic 8-second discharge clears the drum and prevents any accumulation or building up of the concrete in the drum beyond the amount normally carried over and remixed with each succeeding batch. This holds true when mixing any size batch which can be handled in the 27-E Rex paver, or when mixing the concrete to any desired consistency. Field tests show that with sufficient concrete in the drum to permit the buckets to carry full during the entire discharge period, the 27-E paver will discharge approximately 35 cubic feet of mixed concrete in 8 seconds.

## Gas-electric Drive for Trucks

**T**HE operation of nineteen gas-electric trucks owned by the Philadelphia Rural Transit Co., Philadelphia, Pa., was recently analyzed, and it was found that gas-electric drive, heretofore confined in automotive applications to the driving of buses and snow plows, has many advantages when applied to trucks.

The trucks are the product of the Walter Motor Truck Co., Queens Boulevard, Long Island City, N. Y., and the electric equipment, like that used in the gas-electric bus lines in Philadelphia, was supplied by the General Electric Co., Schenectady, N. Y. The trucks were put into operation last winter as snow plows but the design was such that, with the coming of summer, the snow plow attachments could be removed and the vehicles operated as trucks. As such, they were turned over to the Department of Supplies and Utility, and detailed to the heaviest duties.

With a chassis weight of 12,000 pounds and a trailer and load weight of from 16,000 to 20,000 pounds, totaling from 28,000 to 32,000 pounds, it was found that the trucks could maintain a free running speed of over 25 miles per hour on open roads with the motors in parallel or, in the series position, operate through soft dump grounds with practically no temperature rise.



*A Rex Paver Equipped with the Mechanical Man to Save Time and Energy*





If every plow were drawn by horses, **STRENGTH** and **DURABILITY** would be less important factors than they are today. **WIARD** Plows are built for today's high-powered engines, tractors, etc., as well as for animal power. They *stand the gaff*. Simplicity is one reason why: There are only nine parts, aside from bolts and braces. The steel beam is guaranteed against breakage for one year. For full description, see our booklet.

**WIARD'S**  
**"2 in 1"**  
**ROAD OR**  
**CONTRACTORS**  
**PLOW**

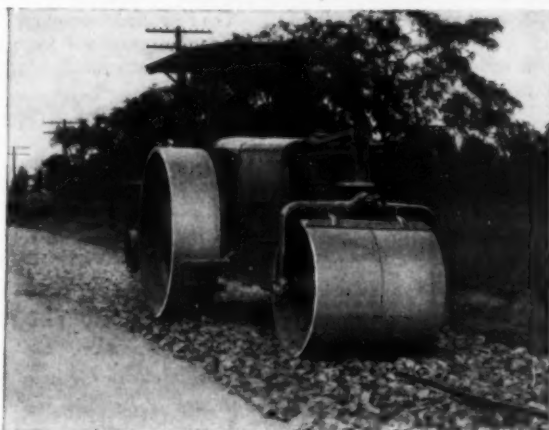
The "2 in 1" feature of this plow is well worth considering, especially from the angle of economy. Simply remove the steel point wing, and you have a practical Rooter Plow. This, by the way, is rarely necessary, as the beam has sufficient strength to carry the bottom through any condition of soil or pavement that is possible to plow, leaving the plowed surface in perfect condition to use scrapers, drag pan, etc.

**The WIARD PLOW COMPANY**  
BATAVIA, Oldest Plow Makers in America NEW YORK

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**Four-Cylinder 10 and 12 Ton Motor Roller**

**has Proven Itself a Real MASTER in Its Field**



From Canada to California, from Washington to Florida, Galion Master rollers have **MADE GOOD** because they're **MADE RIGHT**.

The rear rolls are full 72-inches in diameter—**THEY'LL CLIMB NEW STONE**—less diameters won't.

The 55 hp. Climax Trustworthy motor has proven **TRUST-WORTHY** in service.

The powerful air pressure scarifier will scarify anything that can be scarified.

Many users have bought their second and even third Masters. We would like to send you our new 16 page catalog and give you names of users.

## A Complete Line of Road Machinery

Galion products include Large and Small Rollers, Macadam and Tandem Rollers, Steam and Motor Rollers, in all usual weights, as well as 17 sizes and styles of drawn graders, 7 different Motor Graders, Stone Spreaders, Belt Conveyors, etc.

Write for bulletins and prices on the machines you need

**The Galion Iron Works & Mfg. Co., Galion, O.**

*The World's largest road machinery plant—Representatives everywhere.*

# GALION ROAD MACHINERY

**WILL**

**SERVE**

**YOU**

**BEST**



Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.



*A Walter Truck Equipped with Electric Drive*

The trucks are equipped with Pendal trailer couplers, allowing them to function on a more efficient schedule. The analysis showed that a total of 27,491 miles of gas-electric truck operation over a period of three months was accompanied by no road failures and no engine trouble.

The Philadelphia Rural Transit Co. also owns 66 gear-shift trucks of ten different makes, ranging in size from one to 5 tons. These are used for general utility duty but gas-electric trucks are employed for emergency use. Two gas-electric Walter trucks especially designed for this duty and one Yellow Coach crane-equipped chassis, have been used for over a year. In accident cases on the Atlantic City road, over 50 miles from the garage, the high free running speed of the trucks enabled them to arrive at the scene in a minimum time, while their ability to pull or tow with a smooth application of power, was particularly well suited for that type of work.

A typical day's operation of one of the Philadelphia Rural Transit Co.'s gas-electric trucks on general utility duty included the following cycle, repeated several times with no time lost waiting for loads; spotting four Warner trailers at an excavating job; moving four loaded trailers to dump ground about a mile away with a total load (including the weight of the truck and trailer) of over 15 tons; moving into a dump ground of soft, yielding earth; dumping the load, and coming out again without difficulty. Three- and 5-ton gear-shift trucks, with comparatively lighter loads, invariably had to be hauled out of the same dumping bank.

The General Electric Co. recently put into service in its Baltimore factory a gas-electric Walter tractor-truck similar to those owned by the Transit Co., with the exception of the body which is of the conventional stake type. On a short trial run without load, at Long Island City, this truck was driven down into a field over an almost perpendicular 4-foot bank of soft, yielding earth and out again without difficulty. A 2½-ton Mack truck with gas-electric drive is also being built for service at the Lynn factory of that company.

The driving mechanism of these trucks consists of a direct current generator driven by a gas engine and supplying power for operating two motors each driving a Walters lock-differential axle, thus providing 4-wheel drive.

## A New 20-H. P. Tractor

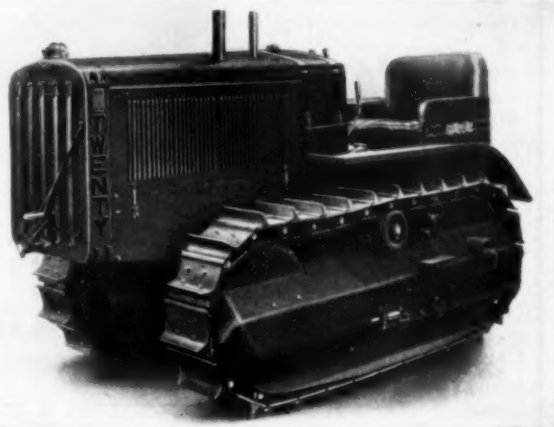
**A** NEW model tractor designated as the "Caterpillar" Twenty, has been produced by the Caterpillar Tractor Co., San Leandro, Calif. With its rating of 20 horsepower at the drawbar, this tractor is new in size, rating and price, and is built to fit into the line of the Thirty and the Sixty, as well as the smaller 2-ton tractors of this company.

The gasoline engine in this unit has a 4-inch bore, 5½-inch stroke, with 1100 r.p.m. The flywheel clutch drives the upper transmission shaft through the all-metal double universal connection. The transmission is the selective gear type, with three speeds forward and one reverse. There is single reduction in all forward speeds. The width of the track shoe is 11 inches. The grease pump has a capacity of 25 pounds. The length over-all is 115.5 inches; the width 61 inches and the height

60.5 inches. The tread is 42 inches. The ground clearance under the transmission is 12 inches. The drawbar height above the ground is 15¾ inches.

A variety of special equipment is provided for the new model to meet all special requirements of owners. Special track shoes may be ordered in place of the standard 11-inch shoes. A spark arrester offers maximum protection against possibilities of sparks coming from the exhaust. A front pull back is available as it is often useful for pulling loads in reverse gear.

Lighting equipment includes powerful headlights, with brackets and necessary wiring. This equipment can be furnished applied at the plant, or boxed for field installation. Bracket bolt holes are tapped into radiator side plates and in the fen-



*The New Caterpillar Twenty*

ders at the rear of the tractor, to enable the owner to locate lights to suit his convenience. Current for the lighting system can be furnished either direct from a generator, or by a generator and storage battery system.

For belt work, a stationary drive can be attached to the rear of the transmission case, this unit connecting directly with the upper transmission shaft. The new model develops 25 belt horsepower. A power take-off can be provided for use with various equipment that is designed to be operated, as well as pulled, by a tractor.

The summer top and cab equipment is of the quickly convertible type. This top consists of an angle iron frame and curved top over the driver's seat. This is easily converted into a completely enclosed cab by the addition of sides and doors or curtains.

---

*"An indispensable element in accident prevention in building construction is adequate and intelligent inspection. In addition to state inspection, the builder who wants to maintain a reputation for safe work will have his own inspectors if he happens to be a self insurer. If he carries his compensation insurance with some company it will send its inspectors to keep a constant check-up on conditions. Inspection to be effective must be by men versed in the game, who can detect the danger and then give intelligent directions to remedy the situation. On many of the larger jobs it pays financially to have one or more inspectors constantly on patrol in order to avoid accidents."*—James A. Hamilton, Industrial Commissioner of New York State.

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**Power!**  
**Economy!**

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McCormick-Deering and Fordson Tractor Driven

**SOLVE EVERY HAULAGE PROBLEM**

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**THEY DO THE WORK OF A FLEET OF TRUCKS — AT HALF THE COST**

**BROOKVILLE LOCOMOTIVES**

are offered in  
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from  
**1½ Tons Weight**  
to  
**12 Tons Weight**  
with  
**3—Forward SPEEDS Reverse—3**

Hundreds of contractors throughout the United States are continually landing enormous jobs by banking on the increased traction and pulling power on rails of the Brookville. You can do the same. Consult us freely on your individual haulage problems. Expert advice cheerfully and promptly furnished.

**BROOKVILLE LOCOMOTIVE CO.**

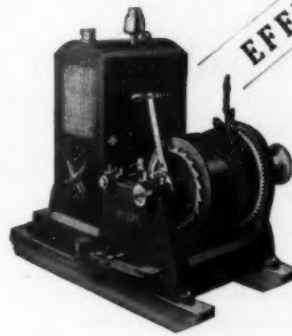
**BROOKVILLE, PA., U. S. A.**



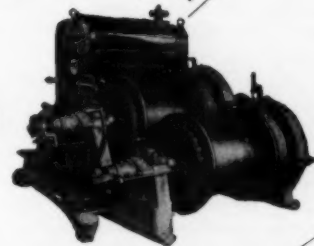
# FLORY HOISTS

**FOR EVERY HOISTING SERVICE**

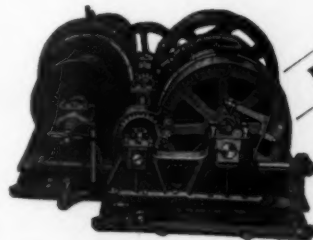
No matter what your hoisting requirements are, Flory has a Hoist to exactly Fit them—a Hoist that's **EFFICIENT**, **DEPENDABLE**, **POWERFUL**. Asbestos Frictions, Asbestos Brakes, Cut Gears, etc., reflect the quality of material used in their construction.



**FLORY "CUB"  
BUILDERS'  
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**FLORY HEAVY  
DUTY, DOUBLE  
DRUM, GASOLINE  
HOIST FOR  
GENERAL  
SERVICE**



**FLORY TWO SPEED  
BAND FRICTION  
SLACK LINE EX-  
CAVATOR HOIST**

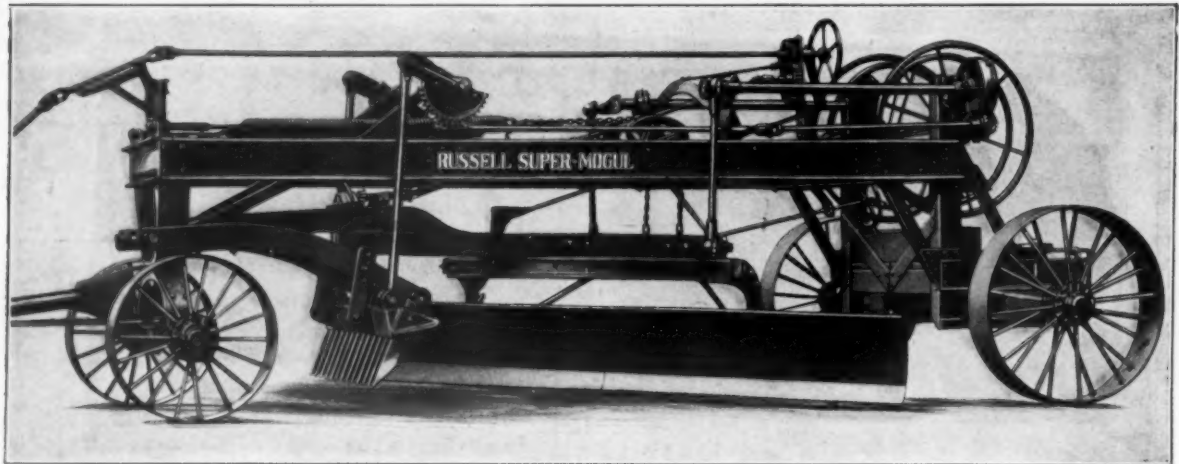
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**BANGOR, PA.**

Flory builds Cableways, Carpullers, Steam, Gasoline and Electric Hoists, Dredging Machinery, etc.

**SALES AGENTS IN PRINCIPAL CITIES**





*The New Russell Super-Mogul Road Grader with Scarifier*

## A New Road Grader

**A** NEW grader, designed better to meet the demands of road building contractors and highway officials, has been produced by the Russell Grader Manufacturing Co., Minneapolis, Minn. It is called the Super-Mogul, and complete with scarifier, weighs 11,950 pounds.

The frame is built of 9-inch ship channel—28.6 pounds per foot. The center shift is a rack and pinion, operated through a worm and gear which are enclosed.

The worm and gear used in the blade lift are machined cut. The gear, instead of being one piece, is a bronze ring bolted on a cast steel hub. The ring gear may be turned or replaced when it becomes worn. There is a bronze bushing in the worm bearing. The worm and gear are completely enclosed in a dust proof case and run in oil.

Ball and socket connections are used in the blade lift. The lift arm is keyed to the lift shaft. The forward bracket for the lifting arm is equipped with adjustable bearing.

The scarifier attachment may be worked without or in combination with the blade. The circle is cast steel and may be completely reversed. The engine steering pole has machined cut worms and gears, fully enclosed and run in oil. Alemite lubrication is used in the entire machine. Large Timken bearings are used in the wheels. One man can easily move the Super-Mogul grader over a floor. The front tread is 61 inches, the rear 108 inches, and the wheel base is 204 inches.

## Time and Money Saving Hoists

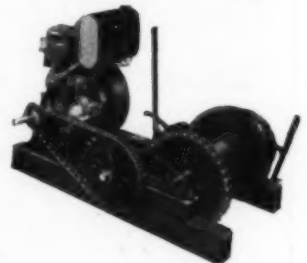
**R**EVERSIBLE and non-reversible hoists that are furnished complete with "New Way" air-cooled engines, are being produced by the Universal Hoist & Manufacturing Co., 200 East 14th Street, Cedar Falls, Iowa. These "Ideal" hoists, which run on kerosene, gasoline or natural gas, are made in two sizes and have a rated lifting capacity of 1000 to 1800 pounds. The heavier models are better adapted for heavier or continuous service, being equipped with electric cast steel gears and large friction clutches. The friction clutches are of the internal expanding ring type. They are lined with renewable compressed asbestos lining. One easily accessible adjusting screw is provided for adjusting the clutch.

The reversible hoists are designed for operating builders' double-cage elevators, using continuous cable running on the large cable wheel provided on the drum shaft. They are also

readily adapted for direct hoisting with single cable from the drum, the same as a non-reversible hoist. They are equipped with asbestos-lined friction hand brakes, and safety locks for holding the load in either direction.

The non-reversible hoists are used extensively for operating single-cage elevators, derricks, pile drivers, cableways, pulling cars, scrapers, excavators and loaders, hay carriers and stackers, log and material handling outfits of all kinds. They are equipped regularly with a friction band brake.

The engine is simple in construction and is easy to operate. American Bosch magneto only is used. The engine is equipped with a float-feed automobile-type carburetor instead of the common mixing valve, insuring easy starting, high economy and smooth operation. All wearing parts are enclosed and run in a bath of oil. The power is variable from 2 to 5 horsepower, and from 5 to 8 horsepower, controlled by automatic throttling governor.



*Reversible Hoist with "New Way" Air-Cooled Engine*

*"As a rule, accidents are more serious in the building industry than in manufacturing. The proportion of total weeks of disability caused in manufacturing and construction does not correspond to the proportion of cases. There is higher percentage of weeks of disability cases per one hundred accidents in the building industry than in manufacturing. There is a higher percentage of fatality in the building industry than in manufacturing. When a worker is hurt in the building industry, it is usually serious, while in manufacturing it is slight."—James A. Hamilton, Industrial Commissioner of New York State, who spoke on "Safety and Accident Prevention in the Building Trades" before the New York Building Congress.*

# DISTRIBUTORS WANTED

## New Catalog Ready

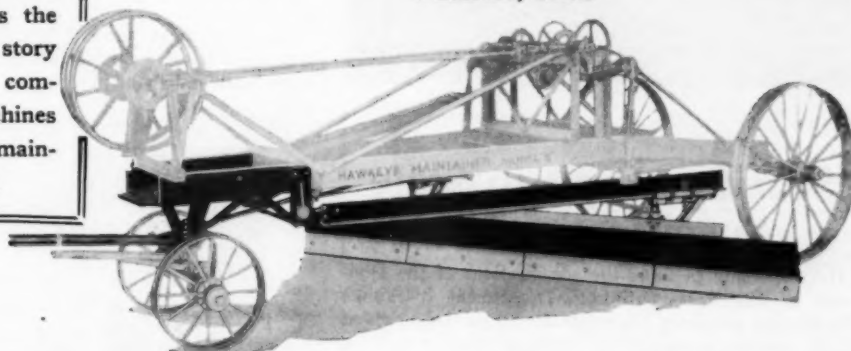


A new catalog of Hawkeye maintainers is ready. It tells the whole Hawkeye story and describes the complete line of machines in all sizes for all maintenance purposes.

A worth-while opportunity is offered exclusive distributors on this complete and advanced line of road maintainers. On exclusive features alone Hawkeye maintainers will outsell any competitor. The direct line of draft is an eye-opener to purchasers of this type of equipment. Complete information on our agency offer will gladly be submitted to responsible distributors.

*Write or wire*

**HAWKEYE MAINTAINER COMPANY**  
Waterloo, Iowa



## Road Maintenance at Lowest Cost

## Hoist and Body Units That Pay Real Profits

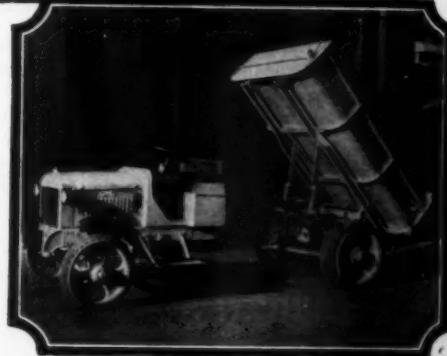
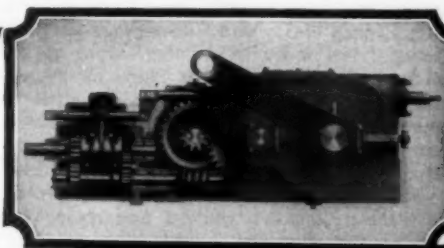
**V**AN DORN hoist and body units are profit producers because their action is positive and trouble-free because they are built to stand the gaff of hard, continuous service.

Constantly bathed in oil and operating on the worm gear principal the hoist mechanism cannot be surpassed for service. The body itself, while lighter than ordinary truck bodies, has a strength far out of proportion to its weight.

A Van Dorn mechanical hoist plus a Van Dorn body is a combination that means real profits for the operator.

**THE VAN DORN IRON WORKS CO.**

2685 E. 79th St.    Truck Division    Cleveland, Ohio



# Van Dorn

MASTERCRAFTSMANSHIP  
IN STEEL

*"More Pay Loads—More Profits"*



*Johnson Scarifier Operated by a Caterpillar Tractor*

## A Scarifier Built to State Specifications

**B**UILT especially to fulfill the specifications of the Division of Highways, California Department of Public Works, for preparing the subgrade for portland cement and asphalt concrete pavement, the Johnson scarifier is being manufactured and marketed by the Edward R. Bacon Co., Folsom at 17th Street, San Francisco, Calif.

These scarifiers are built in three sizes: light, with 9 teeth, cutting 5 feet wide, for working between the side forms after the roadway has been roughly shaped and for other light scarifying; medium heavy, with 7 double-ended teeth 36 inches long, cutting 4 feet wide, for ordinary tearing up and preparation of subgrade using Caterpillar Thirty or smaller tractor; extra heavy, with 7 double-ended teeth 40 inches long, cutting 4 feet wide, for the heaviest scarifying, tearing up old macadam roads, etc., and built substantially enough for use with Caterpillar Sixty or similar tractor. All machines are furnished with adjustable tractor pole attaching directly to the drawbar of the tractor, thus giving a certainty of control that cannot be secured when the scarifier is drawn with a chain hitch to the tractor.

The frame of the Johnson scarifier is "V" shaped, and the teeth, which are reversible, bolt to this frame in such position that the scarifier is most efficient in tearing up the roadway and breaking up clods. The teeth arrangement is such that the two rear teeth reach outside the wheels and will therefore break close to the side forms. The wheels are mounted on individual eccentric axles so that one side or the other of the scarifier may be raised or lowered separately.

The Edward R. Bacon Co. has secured the exclusive rights under the Johnson patents for the manufacture and sale of Johnson scarifiers in the United States, and will distribute this equipment through dealers appointed by its Wholesale Department, which also manufactures and distributes the Carr subgrader on the Pacific Coast.

## A Rugged and Safe Power Saw

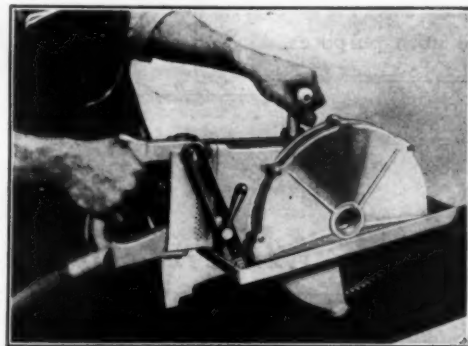
**A** HAND, power saw that cross-cuts and rips 4-inch dressed lumber and that is equipped with a powerful Universal motor which operates on either alternating or direct current, has been produced by the Wappat Gear Works, Pittsburgh, Pa. It is known as the "Alta," is fully guaranteed

against defects in material and workmanship, and is dependable for long hard service.

The outstanding characteristic of this saw is a patented telescoping guard that completely encloses the blade and automatically opens only when the saw is pushed into the material. It automatically closes again as the cut is completed. The wide carrying shoe supports the weight of the tool and prevents tipping. It also insures square cuts and prevents straining the saw blade, thereby eliminating the hazard of broken blades. The shoe is pressed steel nickelplated. Moving over nails, cement, etc., will not injure it.

The handles are so placed to give good balance, which means minimum effort in handling. There are no wrist strains. The total weight is 31 pounds. The weight and wide shoe serve to overcome the gyroscopic effort of the high-speed revolving blade, thereby holding the tool steady and true to its proper course.

Roller bearings and a very efficient quiet-running worm gear drive insure maximum power at the saw blade with minimum wear and without vibration. Three saw blades are furnished.



*The Alta Hand Saw, Showing the Automatic Guard for Blade*

## A New Line of Screw Jacks

**M**ANY improvements in design and finish mark the introduction of a new line of screw jacks which Templeton, Kenly & Co., Ltd., 1020 South Central Avenue, Chicago, Ill., has recently put on the market. Instead of the solid frame, these Simplex screw jacks are built with an open handhole, permitting the screw of the jack to be visible at all times. This informs the operator how high the screw may be run out, which is a practical safety feature. The carrying handle is an ingeniously formed portion of the handhole, being braced and ribbed, which adds strength to the jack. The screw and head are forged from one piece of steel. The standard and cap are made of refined gray iron, which safeguards against cracking or chipping. The base is formed with an extra ribbing, providing stability and strength.

As an aid to more effective handling, each distinct size of these screw jacks is lacquered in a different color with Duco lacquer or color finish, which insures a clear and permanent color that will not rust or corrode.

This line includes 32 sizes, embracing only the styles that are universally in demand. Included in these sizes will be one special size, known as a "Junior Jack," for farm, house, garage and shop use.



*The New Simplex Screw Jack*



# American Steel & Wire Company's

## WIRE FABRIC

"The Steel Backbone for Concrete"



## Making City Street and Country Highway Permanent

**T**O reinforce concrete roads with Wire Fabric makes them permanent and is a proven economy. This fact is conclusively brought out in the report of the Highway Research Board, National Research Council.

Made of cold drawn high tensile strength steel, Wire Fabric has proved itself the perfect slab reinforcement. It gives the most effective distribution of steel—the closely spaced wires insuring greatest binding strength, holding the slab together as a solid unit and preventing the development of cracks.

Wire Fabric means permanent reinforcement—longer concrete life—lower maintenance costs. It is furnished in sheets cut to definite size which are easily handled and placed.

### SALES OFFICES:

CHICAGO.....208 So. La Salle Street	NEW YORK.....30 Church Street
CLEVELAND.....Rockefeller Building	BOSTON.....Statler Bldg.
DETROIT.....Foot of First Street	PITTSBURGH.....Friek Building
CINCINNATI.....Union Trust Building	PHILADELPHIA.....Widener Building
MINNEAPOLIS—ST. PAUL.....101 Marietta St. east	ATLANTA.....94 Grove St. east
.....Merchants Nat'l Bank Bldg., St. Paul	WORCESTER.....22 So. Charles St. east
ST. LOUIS.....506 Olive Street	BALTIMORE.....670 Ellicott St. east
KANSAS CITY.....417 Grand Avenue	BUFFALO.....Miners Bank Bldg.
OKLAHOMA CITY.....First Nat'l Bank Bldg.	WILKES-BARRE.....Russ Bldg.
BIRMINGHAM.....Brown-Marx Bldg.	*SAN FRANCISCO.....2087 E. Stauson Ave.
MEMPHIS.....Union and Planters Bank Bldg.	*LOS ANGELES.....777 Nicolai Street
DALLAS.....Praetorian Building	*PORTLAND.....4th Ave. So., & Conn. St.
DENVER.....First National Bank Bldg.	*SEATTLE.....United States Steel Products Company.
SALT LAKE CITY.....Walker Bank Bldg.	



# J

**does not refuse  
to run in 1928!**

You will find us ready with a complete line of Bins and Batchers—many of them new models that demonstrate the Johnson policy of not only keeping abreast of the market but somewhat ahead!

The Bins and Batchers we offer you in 1928 are the last word in efficient material-handling equipment. Whether you use a standard type or one built especially to your requirements, you will find Johnson construction superior in workmanship and design, and assuring ease and economy of erection. Users of Johnson Bins find their costs lowered and their profits increased.



Full details sent  
upon request

The speedy, simple operation of Johnson Batchers is well-known. Their construction assures a full discharge, they measure accurately, and meet every requirement of state highway departments.

**C. S. JOHNSON COMPANY**  
**CHAMPAIGN ILLINOIS**



*The Burch Concrete Batcher*

## A New Batcher Outfit

**A** NEW batcher outfit that is especially useful to the average contractor who is building concrete roads, has been developed by The Burch Corporation, Crestline, Ohio. This new piece of equipment is designed to be used in connection with the car unloader of this company for measuring material from the car to the truck. With it the contractor can unload material with the unloader and place it in the batcher at a large saving over hand labor.

The batcher is a 2-compartment bin with either side holding from 9 to 24 feet, which can be quickly adjusted to the correct amount for any size bin. Each compartment has a bottom discharge that is controlled with levers by the operator of the conveyor, from the ground. This is done simply by moving a lever one way for discharging one compartment and the reverse for discharging the other. The material is carried from the belt of the conveyor into a small car on the top of the bin and as the compartment is filled, the car is moved to the opposite compartment with a lever by the operator, thus striking off the batch, assuring an even measure in every instance.

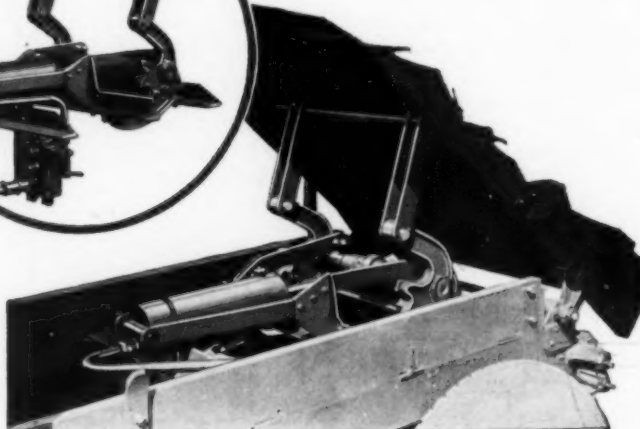
The batcher is equally well adapted to measuring stone, sand or gravel, and two units of this character for handling different kinds of material will greatly facilitate work of the concrete road builder.

## A Fast, Hydraulic Hoist

**D**ESIGNED particularly for short wheelbase, light, speedy, pneumatic-tired trucks with close-coupled chassis, the new G-1, Hi-Speed underbody hydraulic hoist has been developed by the Wood Hydraulic Hoist & Body Co., Detroit, Mich. This new hoist is capable of dumping the load in less than five seconds, and elevates the body to an angle of 60 degrees.

Contractors, road builders and city departments that need power-operated equipment for a short wheelbase chassis of the roadbuilder 1-ton and 1½-ton types, and require speed as the first essential, will be interested in the appearance of this hoist on the market. The hoist is easily installed and simple to operate. Employing the hydraulic principle, it derives its power from the truck transmission. It is light, yet has all the advantages of a heavier unit. It is compact, flexible and convenient in the most congested places.

The hoist can be mounted on a chassis with the loading space behind the cab of from 45 to 50 inches and has a total weight of only 375 pounds.

*The New Wood Hi-Speed Underbody Hydraulic Hoist*

## A 3-speed Crane With Automotive Shift

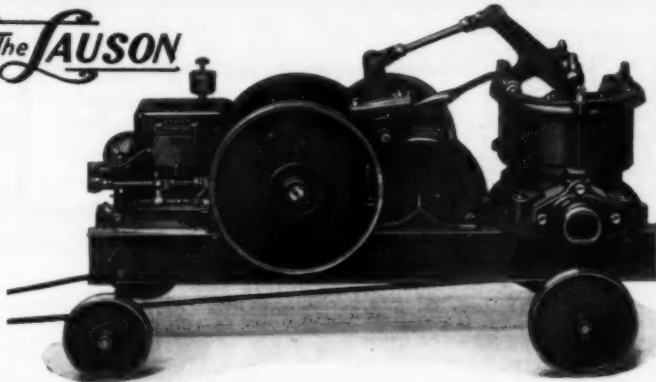
**F**LEXIBILITY is one of the major features of the new "American" gasoline 3-speed crane of the American Hoist & Derrick Co., St. Paul, Minn., which has an automotive shift that works like the transmission on an automobile,—low gear for a powerful start, intermediate for average crane work and traveling, and high gear for rapid traveling. Varying speeds facilitate material handling, for the light load can be handled with speed, while the heavy load can be moved slower and with more power.

This new piece of equipment has a machinery deck that revolves on twenty bronze-bushed conical rollers, which makes slewing easier and reduces friction. The machinery deck is locked to the car body at the outer circumference of a bull gear by an "American" interlocking gib ring. This method distributes the load and stress instead of concentrating it on a king pin.

*A New American Gasoline Three-speed Crane Handling a Hoist from Barge to Shore*

The car body is of structural steel with Bethlehem girder beam side sills and solid semi-steel center casting to support the revolving mechanism, while the transmission is of universal joint automobile type. Capacities are 12 to 30 tons.

*The* **LAUSON**



## Diaphragm Pumps

Furnished complete, with or without pump but with Jack and all necessary fittings for installing leading makes of pumps—a provision which appeals to those who prefer to install their own pumps.

**Complete production of Engine, Jack and Truck in our own factory makes them an exceptionally good buy**

**Furnished in 2 sizes—  
Gas or Electric Motor**

Lauson 2 hp. Engine for 3-in. Pump,  
2½ hp. Engine for 4-in. Pump: ¾ hp.  
Westinghouse Motor for 3-in. Pump,  
1 hp. for 4-in. Pump.

**The Sturdy Jack**

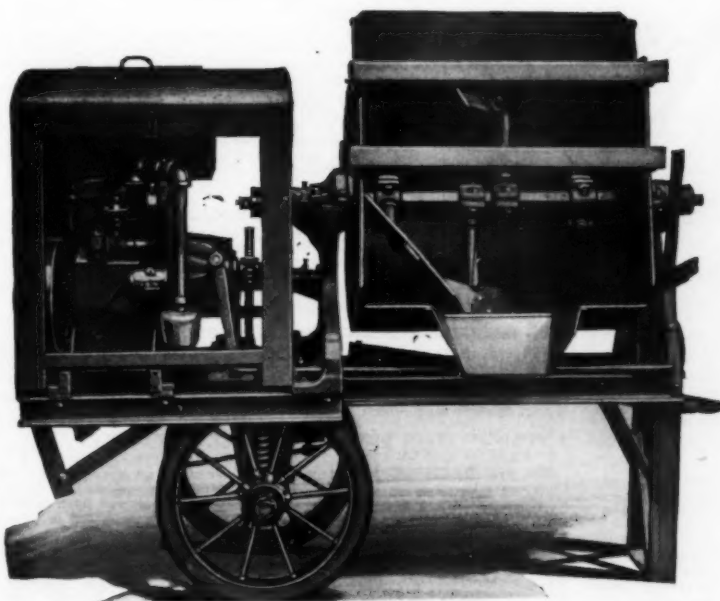
**Fully Enclosed — Gears Running  
in Oil. Driven direct from Engine  
Crankshaft. Bearings high-grade  
Bronze.**



Semi-Trailer, solid-rubber or  
pneumatic tires, on heavy  
disc wheels.

*We also manufacture Gas Engines for every purpose, 2 to 35 hp. and 35-45 hp. heavy-duty Power  
Units, Concrete and Plaster Mixers, Contractors' Saw Rigs. Write for full details on this line.*

**THE JOHN LAUSON MFG. CO., 11 Jackson St., New Holstein, Wis.**



## THRU A DOOR

You can wheel this new THRU-A-DOOR Blystone Mixer through any 30-inch doorway.

That's the difference between the new and the old Blystone. It's more easily handled and moved from place to place than ever before.

And, just as before, it will give you a more thorough mix than you can possibly get by any other method, work dependably at a high rate of speed, keep twenty-five plasters busy, and allow the use of 30-40 per cent more sand than when hand-mixing.

If you like to save money on mixing jobs—if you would like to save the daily wages of a laborer—

We suggest that you investigate this thoroughly satisfactory mixer.

**For plaster, mortar or concrete**

*Have you written for a copy of  
the THRUADOOR circular?*

**BLYSTONE MFG. CO.**  
CAMBRIDGE SPRINGS, PENNA.



# A SERVICE FOR CONTRACTORS

These especially selected catalogs and pamphlets of value to contractors are for free distribution. You will find it worth while to check these lists each month and write for the catalogs you need.

## NEW SPLASH PLATE FOR MIXERS

Complete information regarding the new splash shield which can be attached to any 7-S or 10-S Leach mixer and prevents wet concrete leaving the drum during the mixing and splashing on the men working on the charging side of the mixer, may be secured from the Leach Co., Oshkosh, Wis.

## A GASOLINE CONCRETE BREAKER

A new labor-saving device in the form of a gasoline hammer made for breaking up concrete and asphalt paving, weighing but 85 pounds and operating all day on two gallons of gasoline, requiring no outside equipment to operate it, has been developed by the Milwaukee Gas Tool Corporation, Milwaukee, Wis., from which complete information may be secured.

## A COMPLETE CATALOG OF LATE MODEL MIXERS

A complete catalog and prices on the Kwik-Mix line of trailers and mixers may be obtained on request, from the Kwik-Mix Concrete Mixer Co., Dept. 20, Port Washington, Wis. This catalog includes descriptions of the new No. 3½ Kwik-Mix trailer that features the new friction tilting device and that gives more speed, greater ease and better work, as well as other high-quality, low-priced, tilting mixers, plaster mixers, mortar mixers, and pumps.

## PROVE THE QUALITY OF YOUR CONCRETE

Bulletin No. 26 of the Pittsburgh Testing Laboratory, Pittsburgh, Pa., explains the service of this nationally recognized laboratory, whose certificates of inspection are the most convincing evidence of a good concrete job, giving the contractor the credit that is due him and customer the worth of his money.

## AIR COMPRESSORS FOR SERVICE

Bulletins of The Buhl Co., 405 S. Dearborn Street, Chicago, Ill., describe a variety of types and sizes of air compressors to meet every portable compressor demand of contractors and engineers.

## AN EFFICIENT LUBRICANT

"D-A" Lubricant, a densified Pennsylvania oil for displacing old-fashioned and inefficient cup greases and gear compounds, that is especially adapted for use on heavy-duty machinery, is described in literature of the D-A Lubricant Co., Inc., Indianapolis, Ind.

## A TWIN BACKFILLER THAT SAVES MONEY

A twin backfiller that backfills, shoulders roads, cleans ditches and excavates, and is mounted on a Fordson, and saves time and money on construction and road building jobs, is described in free literature of The Waterman Corporation, 687 East Fort Street, Detroit, Mich.

## A COMBINED TRUCK AND TRACTOR

A new creeper truck that is powered by the Fordson tractor, and is of the rigid, self-supporting type and especially designed for the small operator, is described in literature which the Law Manufacturing Co., 236 West 55th Street, New York, will send free on request.

## A HIGH-SPEED, HEAVY-DUTY TRUCK

Model-AK of Mack Trucks, Inc., 25 Broadway, New York, is a new high-speed, heavy-duty truck with speed and control possibilities of value to the contractor and road builder, with a capacity of 3½ to 5 tons, and is described in free literature of the company.

## NEW IMPROVED BINS AND BATCHERS

The 1928 Johnson bins and batchers which are the last word in efficient material handling equipment, are completely described in the latest literature of the C. S. Johnson Co., Champaign, Ill.

## A HOIST THAT WINS CONFIDENCE

The Dake Engine Co., Grand Haven, Mich., will be pleased to send particulars and prices covering the Dake Type-20 LG hoist which is rigid, of sturdy construction and has many admirable features, including Timken bearings, Alemite lubrication, easily replaceable frictions and ground steel shafts.

## CONCRETE MIXERS AND HOISTS

The complete line of Wonder hoists and Wonder tilting mixers which are more popular than ever, are illustrated and described in the latest literature of the Construction Machinery Co., 447 Vinton Street, Waterloo, Iowa.

## HOISTS FOR ELEVATOR WORK

The Brown Clutch Co., Sandusky, Ohio, will be pleased to send information and prices on its 1928 Model 20-A Giant-Line hoists which are equipped with 4-cylinder, 15-horsepower LeRoi radiator-cooled power units and are rated at 2000 pounds single-line pull at 150 feet per minute for single and double elevator work and all general purpose requirements within their capacity.

## A NEW METHOD OF CULVERT INSTALLATION

The Armo Culvert Manufacturers Assn., Middletown, Ohio, will send practical working data on quick and satisfactory culvert installation by the Armo jacking method, which requires small investment, small crew, quick turn-over and satisfactory returns.

## HOISTING BLOCKS FOR EVERY SERVICE

Star brand hoisting blocks, that are always reliable and are made for every condition of service, are described in literature of the Boston & Lockport Block Co., Boston, Mass.

## ALL STEEL AUTOMOTIVE HOISTS

A catalog of the Ersted Manufacturing Co., 927 Clackamas Street, Portland, Ore., describes and illustrates Ersted all steel, automotive hoists that are built for efficiency and durability.

## HAND BUSH HAMMERS

Descriptive matter is available to those interested in hand bush hammers that are made in sizes for every bushing and dressing job on concrete, by The Dallett Co., Philadelphia, Pa., which also manufactures hand points and chisels, hand and striking hammers, drill bits and hollow steels.

## CRAWLER TRACTORS FOR THE MOST DIFFICULT JOBS

Complete information may be obtained from The Cleveland Tractor Co., Cleveland, Ohio, regarding the line of Cletrac crawler tractors that are built for the most difficult work demanded by the contractor and road builder.

## A TRAILER MIXER WITH CUSHION TIRES

Catalog No. 19-C of the Lansing Co., Lansing, Mich., describes and illustrates the Lansing No. 3-B trailer mixer with cushion tires, that is sturdily built and will give efficient service to contractors and builders.

## FAST EARTH MOVING EQUIPMENT

Big capacity, quick-loading, short-turning, easily handled Baker-Maney self-loading scrapers that give big results for your dollar and more yards per man, and that are made in two sizes, Model-D 1¼-yard and Model-H ¾-yard, are described in literature of The Baker Manufacturing Co., 585 Stanford Avenue, Springfield, Ill.

## DIRT MOVING COSTS LOWERED

The North hydraulic digger that is a powerful, rugged and heavy-duty unit designed for use on that Fordson tractor, and that handles the most difficult dirt moving jobs efficiently and economically, is described in a free catalog of the W. M. Blair Manufacturing Co., 3673 Michigan Avenue, Chicago, Ill.

## FILING SYSTEM FOR DRAWINGS, MAPS AND PLANS

A filing system for drawings, maps and plans that is especially useful in contractors', engineers' and architects' offices, is described in free literature of The Globe-Wernicke Co., Cincinnati, Ohio, which will be sent on request.

## A 95-POUND PUMPING UNIT

A new portable centrifugal pumping unit, weighing 95 pounds with a capacity of 7,500 gallons per hour, with open-type impeller direct-connected to a 1½-horsepower, single-cylinder, air-cooled motor, is described in free literature of the Homelite Corporation, Port Chester, N. Y.

## ROAD MAINTAINERS AND PATROLS

The Hawkeye Maintainer Co., Waterloo, Iowa, has recently issued a new catalog describing the Hawkeye line of road maintainers and patrols. A copy of this catalog will be mailed free on request to any interested contractor or city or county official.

## OF INTEREST TO TRACTOR USERS

The Trackson Co., 519 Clinton Street, Milwaukee, Wis., has begun the publication of a truly serviceable house organ named "Trackson Tracks" to keep tractor users informed of new developments in the production, application and sale of Trackson crawlers and their uses in connection with other tractor equipment. Any municipal officials or contractors interested may have their names placed on the mailing list for this publication without cost by returning this clipping to the company.

## PILE HAMMERS FOR THE MOST DIFFICULT JOBS

You can speed up your pile driving and pile pulling jobs with Union pile hammers, that are made in nine sizes, and will handle the most difficult jobs quickly, efficiently and economically. These pile hammers are completely described in the "Contractors' Bulletin 63," of the Union Iron Works, Lackawanna Siding, Hoboken, N. J.

## A FULL-ROTATING DERRICK FOR FAST, ECONOMICAL PERFORMANCE

The new Dobbie full-rotating derrick that revolves on a single, circular track, on roller bearing equipped wheels, is capable of making 2.4 revolutions per minute, is steel constructed throughout and operated by a Mundy 3-speed hoist powered by a 60-horsepower engine. It is described in literature which The Mundy Sales Corporation, 30 Church Street, New York, distributors for The Dobbie Foundry & Machine Co., Niagara Falls, N. Y., will send on request.

## A NEW ASPHALT KETTLE TRAILER

The new Aeroil asphalt kettle trailer, with rubber tires, leaf springs and roller bearings, that melts and heats pitch or asphalt in one-half the time required for wood fires, and is made in 25- to 165-gallons capacity, is illustrated and described in free literature of the Aeroil Burner Co., Inc., West New York, N. J.

## A METAL TROUGH FOR USE OVER MUD HOLES

Metalrut, which is a light, portable, curved trough of heavy-gage corrugated metal, built in 10-foot sections, for laying over mud holes, frost holes, washouts, snow-drifts, sand-drifts, etc., and which paving, grading, and trucking contractors will find most useful in keeping impassable roads open for trucks hauling material, is made by the Metalrut Co., 3-23 West Water Street, St. Paul, Minn., and described in a catalog of the company.

# ALWAYS... doing a Bigger Better job!



When you start the day's work with Russell Equipment you are bound to accomplish more work and better work—a day of maximum results and satisfaction.

You are going to demonstrate more than ever before the absolute necessity of using the best equipment obtainable to do the best work—proving fully and finally the superior service, capacity and dependability of Russell Road Machinery.

Russell Machines are built to meet the ever increasing *unusual and extreme demands*. Extra strength is built into the parts that must often bear the brunt of terrific strain—here is your assurance of no delays—no mishaps—real economy from every angle of operation.

The present year will set a new record for road work and we offer new features and improvements that demand your closest consideration and investigation.

*The complete Russell Line for Road Construction, and Road Maintenance includes—*

- 4 Sizes Motorized (Unified) Road Machines
- 10 Sizes Road Machines (for Horse or Tractor Power)
- 3 Sizes Elevating Graders

*Scarifiers, Road Drags and Wheel Scrapers, Drag Lines, Conveyors, Gravel Screening, Crushing and Loading Equipment, etc.*

**Russell Grader Manufacturing Company**  
Factory and General Offices—  
**MINNEAPOLIS, MINN.**

*Representatives and Warehouses in all principal cities*

# RUSSELL

**BETTER BUILT**  
**ROAD EQUIPMENT**

## "Howdy!" Meet these Master Bucket Builders



When you visit our plant you'll see many bucket building experts who have specialized in this work here for ten years and more—also some father-and-son combinations that show how building better buckets can be an inherited talent.

And because these men take real pride in *building buckets up to a standard and not down to a low competitive price*, you can buy the Williams with definite guarantees of Digging Ability, Capacity and Durability.

Our new catalog shows Williams Buckets on a wide variety of work. Giving you an idea of how we can meet any bucket requirement you may have, with a bucket that's "Built to Dig, and Last While Digging." Write for it.



Williams "Double-Arch" Dragline—you'll never see the sides of this bucket drawing in.

**G. H. WILLIAMS COMPANY**  
609 Haybarger Lane, Erie, Pa.

*Branch Offices: New York, Pittsburgh, Cleveland, Chicago*

# WILLIAMS

**FAST-DIGGING BUCKETS**

**A SUPER-CHARGER FOR AIR ECONOMIES**

The super-charger recently put on the market by the Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, Ill., for use with the Thor Six compressor, is designed to counteract the various losses in air delivery experienced in compressors, and is described in literature of the company.

**A GUN FOR APPLYING LIQUIDS**

A new gun for spraying or shooting liquids of practically any consistency or temperature through special, insulated, metallic hose, any distance up to several hundred feet, that has volume, pressure and temperature under control, is described in literature which Quigley Furnace Specialties, Inc., 26 Church Street, New York, will be glad to send to interested contractors and engineers.

**POWER DRAG SCRAPERS FOR HEAVY HAULAGE**

Information regarding the Sauerman power drag scraper that is capable of hauling the toughest digging and capable of conveying from 30 to 50 loads per hour to the hopper or pile, and that comes in sizes from  $\frac{1}{4}$  to 6 cubic yards, will be sent to interested contractors and engineers, by Sauerman Bros., Inc., 464 So. Clinton Street, Chicago, Ill.

**A RUGGED AND SAFE POWER SAW**

A hand, power saw, the "Alta," that cross-cuts and rips up to and including 3-inch material, and that is equipped with a powerful Universal motor which operates on either alternating or direct current, is described and illustrated in a circular of the Wappat Gear Works, Pittsburgh, Pa.

**A 3-WAY HOIST AND DUMP BODY**

An improved hoist and dump body built to fit any motor truck or trailer, that can be dumped to the rear and both sides and is built in capacities of 1½ to 15 tons, is described in an illustrated circular of The Commercial Shearing & Stamping Co., Youngstown, Ohio.

**WIRE ROPE AND CABLE**

A booklet entitled "Fathers of Industry," gives a brief historical sketch of the Hazard Manufacturing Co. and the Hazard Wire Rope Co. and their founders and tells all about their beginnings in the wire rope and cable business. This interesting booklet may be secured from the Hazard Manufacturing Co., Wilkes-Barre, Pa.

**SNOW LOADING EQUIPMENT**

Catalog 1027 of the George Hais Manufacturing Co., Inc., 142nd Street and Park Avenue, New York, describes and illustrates snow loaders for the most difficult snow conditions, that speed up snow clearance at low costs, and are built for maximum durability and efficiency.

**ELECTRIC HOISTS FOR CONTRACTORS AND BUILDERS**

Catalog No. 9 of the Thomas Elevator Co., Chicago, Ill., thoroughly describes and illustrates the Thomas line of electric hoists and gives complete information regarding their use and application in the contracting and building fields.

**A READY-MIX CONCRETE, REAR-BOTTOM DUMP BODY**

A new ready-mix concrete, rear-bottom dump body, made exclusively for the Hug roadbuilder chassis, and that remixes the concrete in the process of dumping, is automatic in every feature, simple in construction, and is described in literature of The Hug Co., Highland, Ill., which will be sent on request.

**ONE-MAN TRACTOR SCRAPERS**

Loading, hauling, dumping and spreading, and returning for the load all by tractor power, easily controlled from the driver's seat while the tractor is in motion are possible with the Schaefer one-man tractor scraper of The Gustav Schaefer Wagon Co., 4180 Lorain Avenue, Cleveland, Ohio. These scrapers, with or without back-up-control, are described in a booklet which will be sent on request.

**TRENCH AND SEWER BRACES FOR SAFE BRACING**

Simplex trench and sewer braces that provide safe, practical and economical bracing on all trench jobs, are sturdily built and will give years of service, with steel screws and malleable iron fittings. They can be quickly applied or removed, and are described in literature of Templeton, Kenly & Co., Ltd., 1020 South Central Avenue, Chicago, Ill.

**A DROP-FORGED WRENCH FOR EVERY NEED**

Literature describing the Herbrand drop-forged wrench for every possible need and that can be depended upon to do the work in every case, will be sent on request, by The Herbrand Co., Fremont, Ohio.

**POWER UNITS FOR RUGGED SERVICE**

Whether you want utmost compactness, ruggedness, greater flexibility, endurance and capacity for hard work, or greater economies, Hercules power units and 4- and 6-cylinder engines, will solve your problems and give you the most for your time and money. Power curves and specifications of these units will be sent to interested parties, by the Hercules Motors Corporation, Canton, Ohio.

**AN AUTOMATIC PRIMER FOR PUMPS**

The American Steam Pump Co., Battle Creek, Mich., will be pleased to send catalogs and prices on the new American-Marsh portable pumping outfit which includes the patented automatic primer operating from the engine intake manifold, with which the pump primes itself in less than one minute and stays primed as long as the engine runs.

**A NEW CATALOG OF MOTOR GRADERS**

A new 16-page catalog, fully illustrated with many operating pictures and describing the Galion McCormick-Deering motor grader has just been issued by the Galion Iron Works and Manufacturing Co., Galion, Ohio, from which copies may be secured on request.

**AN ALL-STEEL HAND HOIST**

An all steel hand hoist with capacity of 5 tons straight line, with positive internal brake, weighing 110 pounds and with two speeds, is described in literature of Beebe Bros., 3219 First Avenue, South, Seattle, Wash.

**CONCRETE FORM SPACERS, COLUMN TIES, CLIPS, ETC.**

Catalog No. 227 of the Union Steel Products Co., manufacturer of reinforced concrete and metal lath building specialties, Albion, Mich., thoroughly describes and illustrates the complete line of this company, and will be sent to interested parties.

**A NEW 2-TON TRUCK**

The new 2-ton truck of Graham Brothers, Detroit, Mich., the truck manufacturing division of Dodge Brothers, Inc., has a 6-cylinder engine, 4-speed transmission, 3 optional rear axle ratios, 4-wheel Lockheed hydraulic internal brakes, 114-inch wheelbase and a frame of 7¼-inch depth, and a speed of 35 miles per hour. Complete description will be sent by the manufacturers.

**A GASOLINE-POWERED SAW TABLE**

A contractors' saw table that is easily portable and powered by an air-cooled gasoline engine, and that will save its cost over and over again on small dwelling operations, is completely described and illustrated in a circular of the Jones Superior Machine Co., 1258 W. North Avenue, Chicago, Ill.

**A FAST, NEW, HYDRAULIC HOIST**

Designed particularly for short wheelbase, light, speedy, pneumatic-tired trucks with close coupled chassis, the new G-1, Hi-Speed underbody hydraulic hoist of the Wood Hydraulic Hoist & Body Co., Detroit, Mich., is capable of dumping the load in less than five seconds, and is described in Bulletin No. 152 of the company.

**A PIVOT-CONVEYOR TRENCHER**

A new trenching machine, featuring the "pivot conveyor," which makes it possible for the conveyor handling the spoil to swing in a 180-degree arc and discharge on to a truck alongside or ahead of the machine, while working at any depth, thus saving the cost of rehandling the material, is described in a circular of The Cleveland Trencher Co., 20100 St. Clair Avenue, Cleveland, Ohio.

**BAGS THAT WILL FULLY PROTECT CEMENT AND PLASTER**

Bates Multi-Wall paper bags that have five stout walls to protect your cement and plaster from moisture and rough handling, and of which sample bags are taken from each run, packed with a full 94 pounds of cement, and dropped repeatedly in a special testing machine, thus making certain that every bag is safe and strong, are described in an interesting circular of the Bates Valve Bag Corporation, 35 E. Wacker Drive, Chicago, Ill.

**A NEW KIND OF FINISH-GRADER**

The Nu-Method finish-grader of A. W. French & Co., 8440 Lowe Avenue, Chicago, Ill., is a machine for cutting the finish or fine grade on which is to be laid a concrete slab or road, to be used after the rough grading is finished and forms have been set for the placing of concrete. This new piece of time and labor saving equipment is described in a circular of the manufacturer.

**A NEW BATCHER OUTFIT**

A new batcher outfit that is designed to be used with the Burch unloader, enabling the contractor to unload material with the unloader and place it in the batcher much cheaper than can be done by other methods, is described and illustrated in catalogs and circulars of The Burch Corporation, Crestline, Ohio.

**GASOLINE AND ELECTRIC EXCAVATING MACHINERY**

Bulletin No. 2707 of The Osgood Co., Marion, Ohio, describes and illustrates the Osgood line of gasoline and electric excavating machinery, and also gives an interesting historical sketch of the company.

**6-CYLINDER ENGINES FOR PAVERS**

Heavy-duty 6-cylinder Hercules engines have been adopted as optional equipment on the 1928 Multi-Foot pavers of the Foote Co., Inc., Nunda, N. Y., and are described in literature which the company will send to interested highway engineers and contractors.

**GAS WELDING AND CUTTING EQUIPMENT**

A dependable line of gas welding and cutting equipment that has been approved by the Underwriters' Laboratories, and is built to stand the abuse of constant use, is described and illustrated in catalog No. 28 of the Torch Weld Equipment Co., 224 N. Carpenter Street, Chicago, Ill.

**AN OVERHEAD, DIRECT-DRIVE ADJUSTABLE SAW**

A contractors' saw, the "Wonder-worker," that has an overhead direct-drive adjustable motor which can be swung into almost any conceivable position, permitting the application of saws, dado heads and cutting tools of all description, and that is a portable machine with protective capacity, is described in illustrated circulars of the DeWalt Products Co., Leola, Pa.

**THE ALL-PURPOSE, ONE-MAN CRANE-SHOVEL**

A 64-page book, published by The Byers Machine Co., Ravenna, Ohio, is filled with interesting pictures and performance facts regarding Byers' Bear Cat, the all-purpose, one-man crane-shovel, and will be sent to interested parties, on request.

**A PAVEMENT CORE DRILL**

A self-contained pavement core drill that is used to take solid cores of approximately 6 inches in diameter from concrete, brick or asphalt pavements, has been developed by the H. C. Nutting Co., Cincinnati, Ohio, and is described in literature of the company.

**A NEW STURDILY BUILT ROAD GRADER**

A new road grader, designed better to meet the demands of road building contractors and highway officials, has been produced by the Russell Grader Manufacturing Co., Minneapolis, Minn. It is called the Super-Mogul, and is described in literature which the company will send on request.

**A SCARIFIER BUILT TO STATE SPECIFICATIONS**

The Johnson scarifier built especially to fulfill the specifications of the Division of Highways, California Department of Public Works, for preparing the subgrade for portland cement and asphalt concrete pavement, is being manufactured by the Edward R. Bacon Co., Folsom at 17th Street, San Francisco, Calif., and is described in literature of the company which is available on request.

**A LARGE CAPACITY, ELECTRIC HAND SAW**

An electric, portable, hand saw, Model "M," with a cutting depth of 4¼ inches, weighing 28 pounds, and built for heavier wood cutting work, has been developed by Skilsaw, Inc., 3814-24 Ravenswood Avenue, Chicago, Ill., and is described in illustrated circulars of the company.

**A NEW TRUCK FOR ROAD BUILDERS**

A 3-ton, 6-cylinder road builders' truck, the "Trail Blazer," that has been especially designed for the most difficult jobs, has been produced by the Autocar Co., Ardmore, Pa., and is described in literature of the company.



